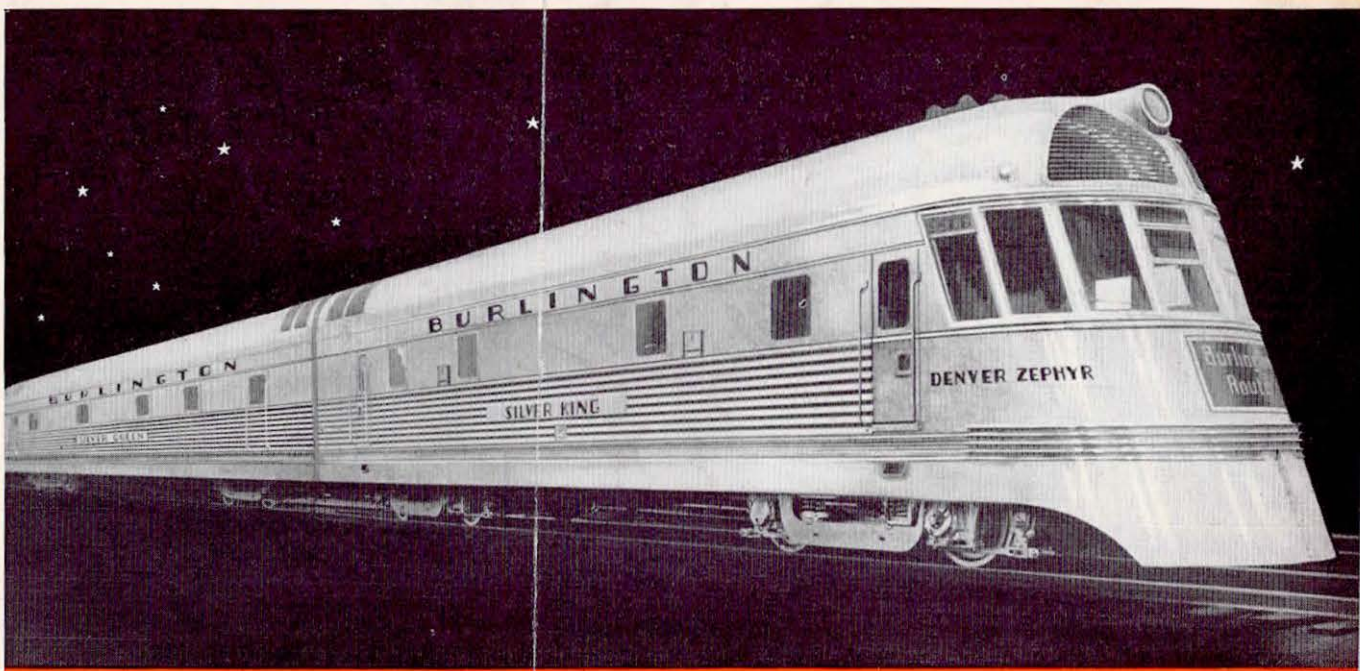
OCTOBER 31, 1936

Railway Age

Founded in 1856

McCARTNEY LIBRARY
GENEVA COLLEGE

EMC DIESEL POWER MEETS THE INCREASING DEMANDS . . . . . FOR SUSTAINED HIGH-SPEED SCHEDULES . . . . . .



built by EMC!

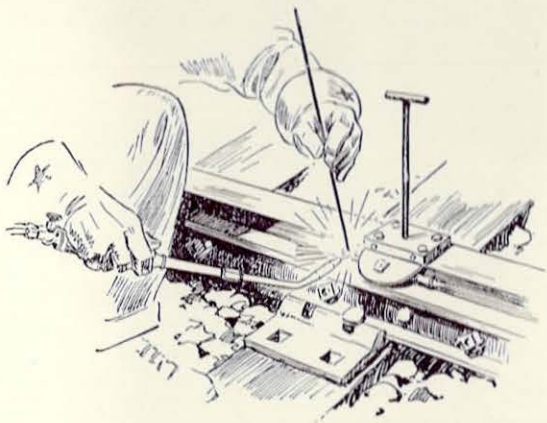
3000 horsepower of flashing speed! The "Silver King" and "Silver Queen" power one of the two new twelve-car de luxe Denver Zephyrs soon to be placed in operation. This Diesel locomotive, built complete by EMC, represents the highest attainment in engineering technique, precision workmanship and the use of special materials—all so essential to meet the exacting requirements of spectacular regular service of 1034 miles daily at an average speed of 64.6 miles per hour.

ELECTRO-MOTIVE CORPORATION
SUBSIDIARY OF GENERAL MOTORS
LA GRANGE, ILLINOIS, U.S.A.

E-M

EMC DIESEL POWER

high-speed RAIL BONDING by OXWELD

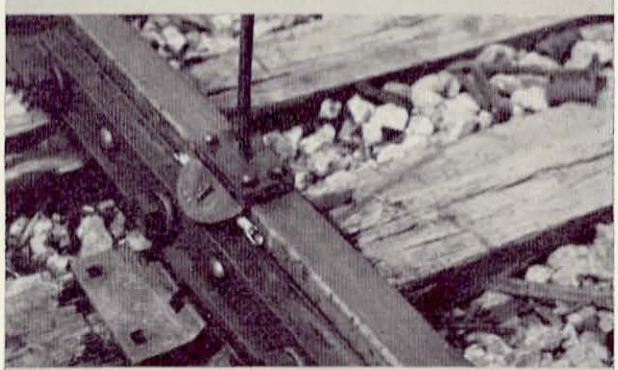


OXWELD Railroad Service has developed improved methods for bonding rail quickly at low cost. A bond made by the oxy-acetylene process with No. 19 Cupro Rod under Oxweld procedures stays bonded...assures trouble-free electrical connection between the rail ends. By doing your rail bonding according to these Oxweld procedures you can be sure of a fast, low-cost, job.

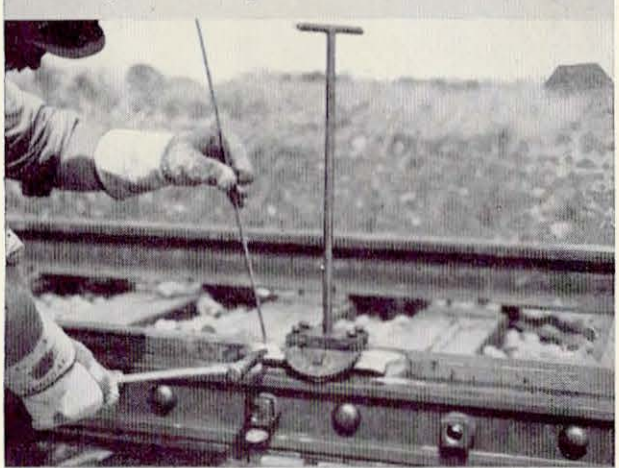
This illustrates only one of the many ways in which Oxweld Railroad Service has been improving track and saving money for American railroads for almost a quarter of a century. That is why a majority of the Class I railroads are Oxweld contract customers.

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
New York: Carbide and Carbon Bldg.
Chicago: Carbide and Carbon Bldg.

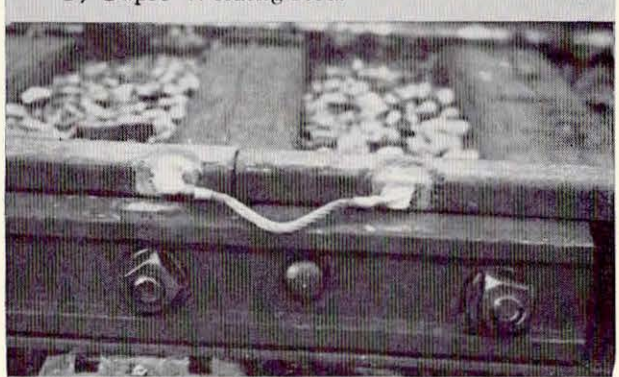
OXWELD RAILROAD SERVICE



The bond is securely clamped in place ready for welding.



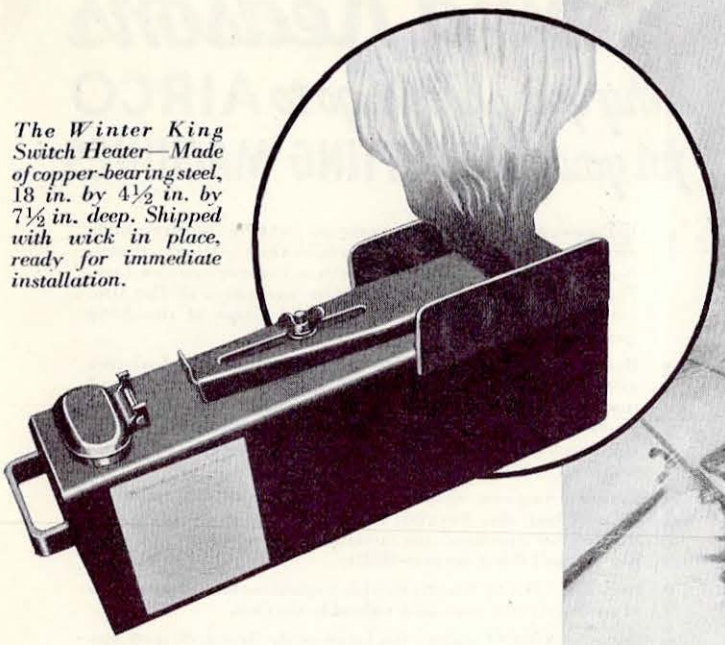
The bond is welded to the rail with No. 19 Cupro Welding Rod.



The finished bond, fixed to the rail ends makes trouble-free electrical connection.

Published weekly by Simmons-Boardman Publishing Company, 1309 Noble Street, Philadelphia, Pa. Entered as second class matter January 4, 1933, at the Post Office at Philadelphia, Pa., under the Act of March 3, 1879.

Let Blizzards rage



The Winter King Switch Heater—Made of copper-bearing steel, 18 in. by 4½ in. by 7½ in. deep. Shipped with wick in place, ready for immediate installation.

Winter Kings will pull their teeth

16 inches of snow in 1½ days didn't bother the switches at one large terminal where 4000 Winter Kings were burning.

It's at switches that winter storms get a strangle-hold on a railway system. Winter King Switch Heaters effectively prevent that. They are an efficient means of keeping switches clear of ice and snow. They do away with the need for large crews always on call to remove snow manually—eliminate the danger of costly accidents that are always liable to occur when large numbers of untrained men are at work in yards.

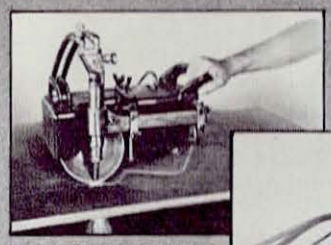
First cost of Winter Kings is small. Fuel amounts to only a few cents a day. Little attendance is needed—a filling of kerosene lasts from 9 to 15 hours. One man can take care of approximately 100 heaters. To install them, simply place the heater under the switch points, between the ties, with the protective flange up against the bottom of the rail. Six heaters take care of an 11-foot switch; eight, a 16-foot switch. Heaters stay in place all winter, can be removed and stored in the spring, ready for re-use year after year. They should be lighted at the first sign of snow—allowed to go out when the weather has cleared.

Before the first heavy snow, install Winter Kings under all important switches. Now is the time to assure the saving that Winter Kings can bring this winter—and for many winters yet to come.

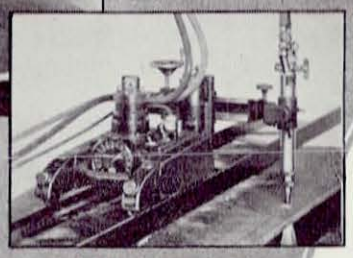
BETHLEHEM STEEL COMPANY, *General Offices*: Bethlehem, Pa. *District Offices*: Albany, Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Hartford, Honolulu, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, New York, Philadelphia, Pittsburgh, Portland, Ore., Salt Lake City, San Antonio, San Francisco, St. Louis, St. Paul, Seattle, Syracuse, Washington, Wilkes-Barre, York. *Export Distributor*: Bethlehem Steel Export Corporation, New York.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL



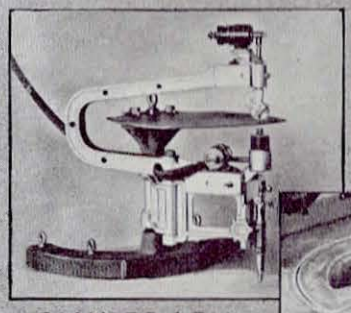
TRACTOGRAPH

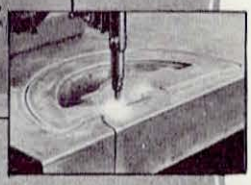


RADIAGRAPH

Sound Reasons

why you should go to AIRCO for your GAS CUTTING MACHINES

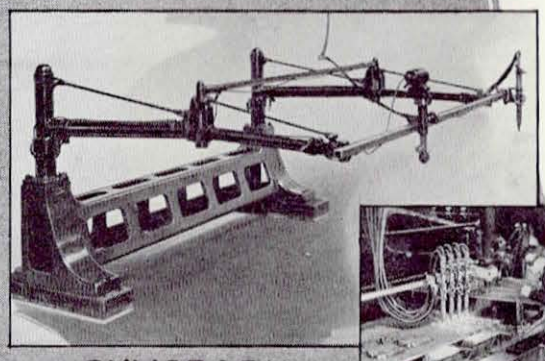


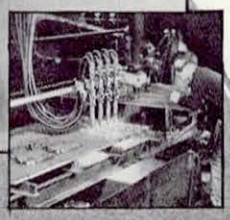


OMNIGRAPH

1. Because, no matter what your gas cutting requirements are, there is an AIRCO-DB machine that will serve them. Nowhere else will you find such a comprehensive line. Illustrations show representative members of the line which covers the entire range and scope of machine gas cutting.
2. Because every AIRCO-DB machine embodies features and advantages which simplify machine gas cutting and make it profitable . . . Every machine has long since passed through the trial stage . . . Every one has been thoroughly proved in service as the records of thousands of satisfied users testify.
3. Because you can obtain from AIRCO not only the machines, but also oxygen, acetylene and everything else needed for machine gas cutting . . . One source of supply — undivided responsibility.
4. Because AIRCO'S nation-wide organization assures you of prompt, efficient and valuable service.
5. Because AIRCO maintains large-scale Research and Applied Engineering Departments, manned by men thoroughly versed in gas cutting practice, whose function it is to aid users of AIRCO-DB machines in solving their gas cutting problems and in securing maximum benefits and economies from the process and machines.

Your best interests are served when you deal with AIRCO.



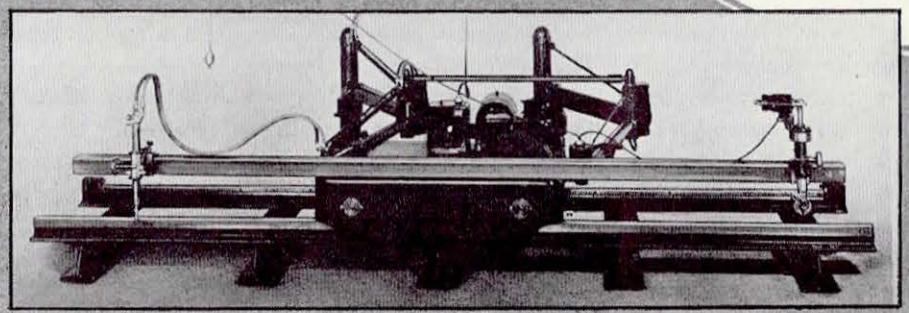


OXYGRAPH

AIR REDUCTION
SALES COMPANY

General Office: 60 East 42nd St., New York

District Offices and Distributing Stations in Principal Cities



TRAVOGRAPH

THE NATION-WIDE WELDING AND CUTTING SUPPLY SERVICE

NEW HAVEN R.R. ACCEPTS THE CHALLENGE

WITH DIESEL LOCOMOTIVES

AMERICA is challenging her railroads today to do a better job with the country's transportation problems. Goods must be moved faster, cheaper, with less loss and on more definite schedules.

The New York New Haven & Hartford is one of the country's progressive roads which is meeting this challenge. The illustration shows one of five 100-ton Cooper-Bessemer Diesel electric switching locomotives which are being put into service by this road.

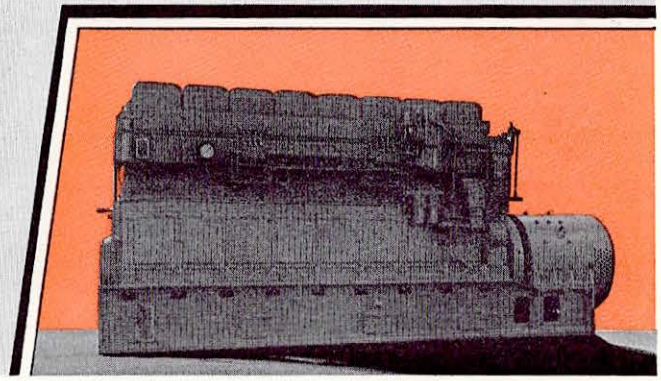
Cooper-Bessemer is one of the oldest engine manufacturers in this country. In building Diesel engines for locomotives nothing can take the place of experience.

COOPER-BESSEMER CORPORATION

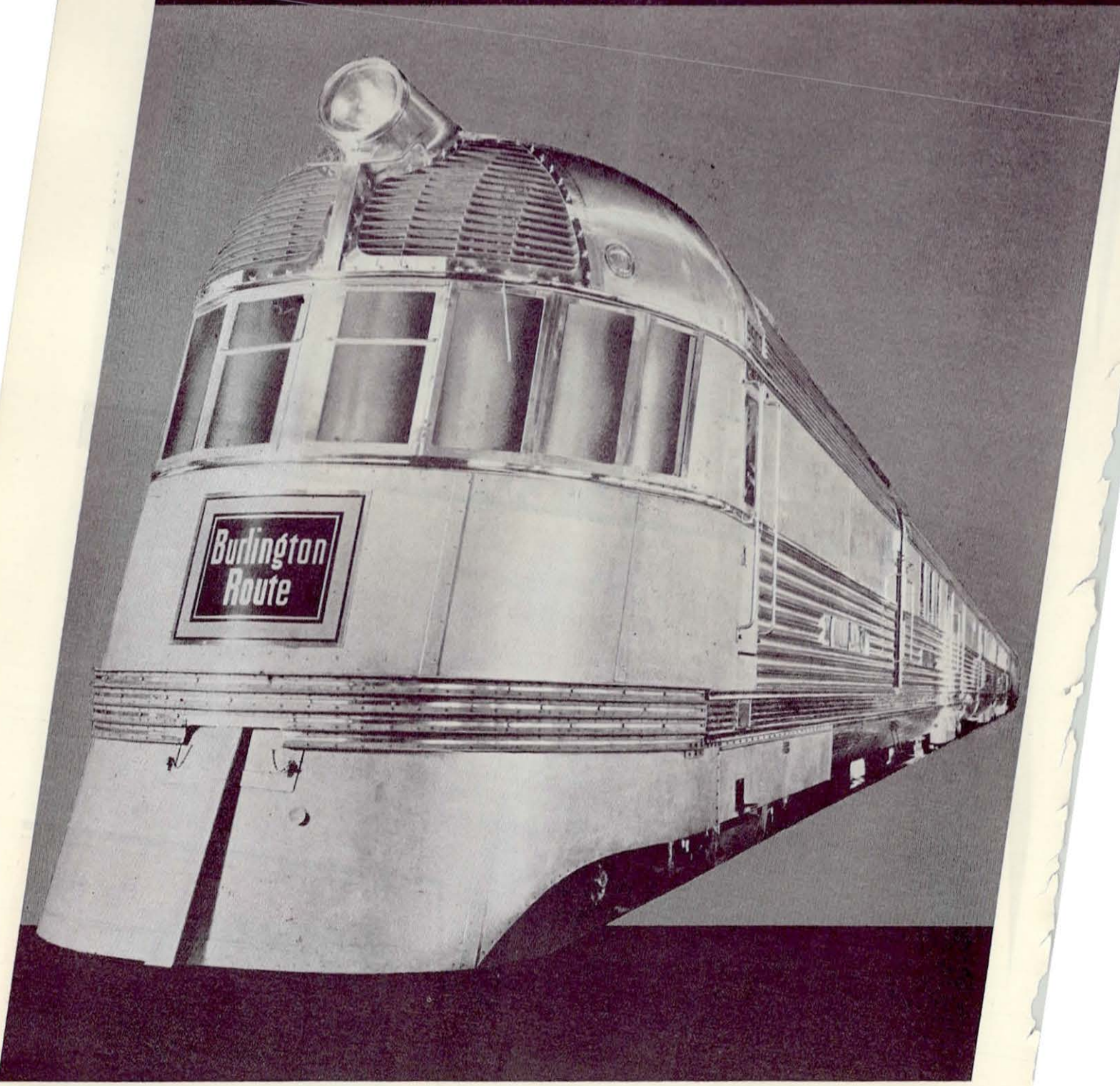
Mt. Vernon, Ohio—PLANTS—Grove City, Pennsylvania

25 West 43rd Street, New York City — Mills Building, Washington, D. C. — 640 East 61st Street, Los Angeles, Calif. — 201 East 1st Street, Tulsa, Oklahoma — 631 Spring Street, Shreveport, La.

53 Duncan Street, Gloucester, Mass. — Magnolia Building, Dallas, Texas — Esperson Building, Houston, Texas — Gas and Power Equipment Co., Birmingham, Alabama



244,082 MILES OF



PROFITABLE SERVICE!

THE MARK TWAIN ZEPHYR COMPLETES ITS FIRST YEAR

Another record to aim at! On October 27, 1935, the Mark Twain Zephyr of the Burlington Route went into service between St. Louis and Burlington, Iowa. This light-weight stainless-steel train was in operation on that run until May 31, 1936, covering 89,361 miles. On May 31 it went into service as one of the Advance Denver Zephyrs making a daily run of 1034 miles between Chicago and Denver in 16 hours—one of the fastest of the new high-speed schedules. During its first year, this Budd-built train carried 57,509 passengers in its three coaches. It has been available for 99.4% of its scheduled runs.

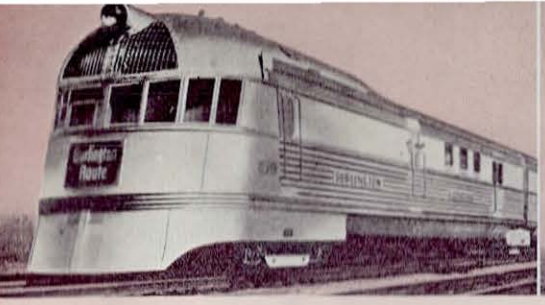
And so another Budd-built train makes a remarkable record for dependable, profitable operation. The sensational success of these light-weight trains places them far in the forefront in the modern competition for passenger traffic. Because of their overwhelming popularity with travelers and their safe, light-weight construction, Budd-built trains continue to increase revenue and lower operating costs every minute they are in service.

DO YOU WANT THE INSIDE STORY OF BUDD-BUILT STREAMLINED TRAINS? . . . LET US SEND YOU "THE CONQUEST OF WEIGHT."

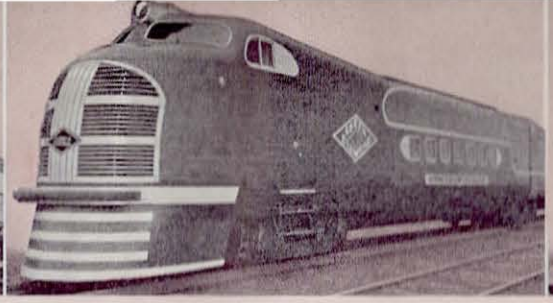
BUDD METHODS SAFELY ELIMINATE DEAD-WEIGHT

EDW. G. BUDD MANUFACTURING COMPANY

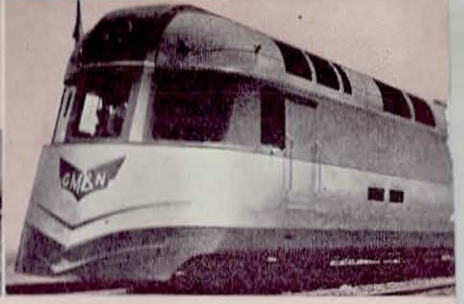
RAILWAY DIVISION PHILADELPHIA



The Burlington "Zephyr" — constructed of USS 18-8 Stainless Steel. Made the 1015 mile run between Denver and Chicago at average speed of 77.5 m.p.h. Weight of entire train 195,000 lb.



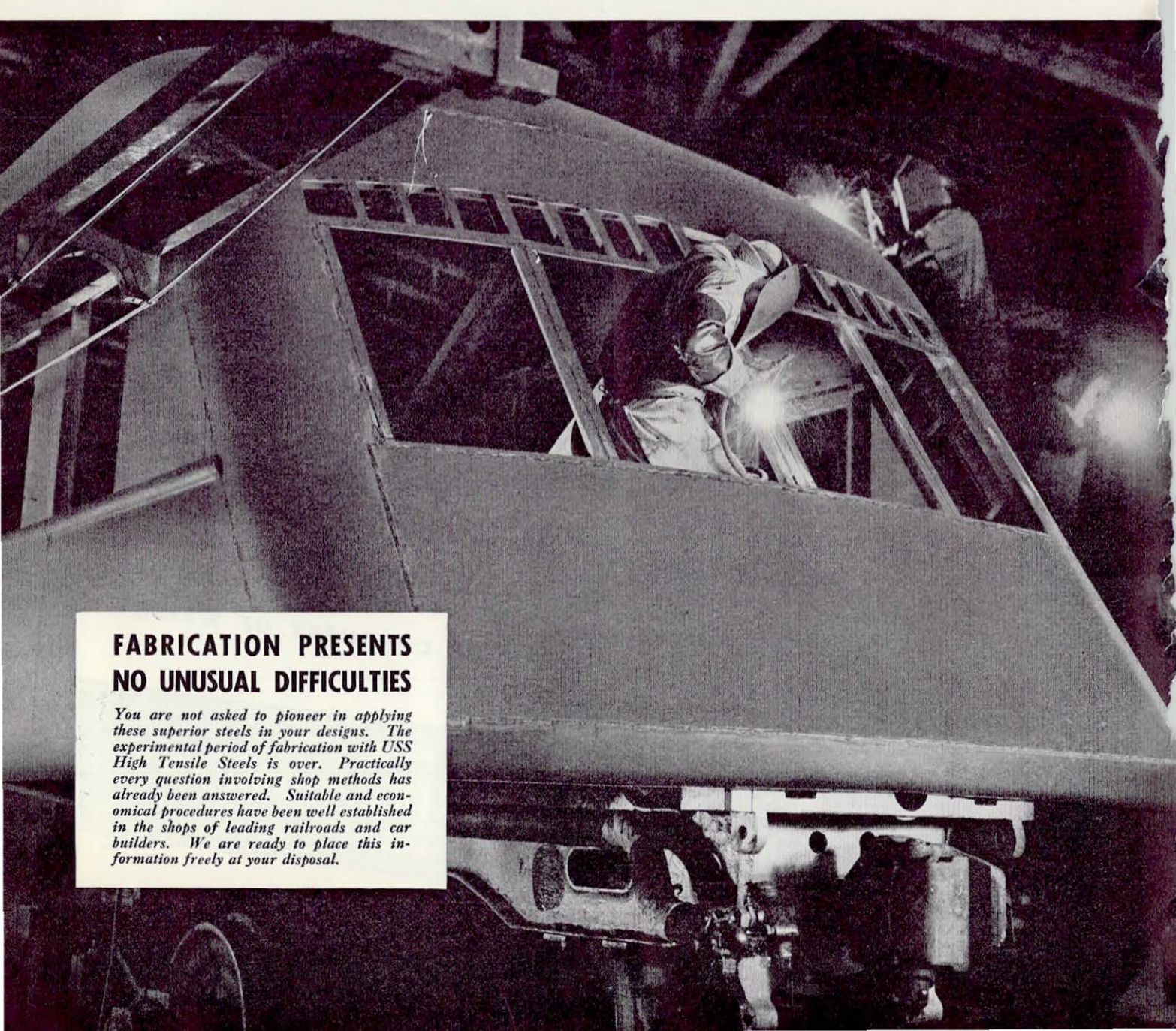
In the Illinois Central "Green Diamond"—USS COR-TEN, riveted and welded, replaces usual rolled sections of mild steel. The reduction in weight is 50% from that of similar trains of same capacity.



USS COR-TEN used throughout "The Rebel" tr of the Gulf, Mobile and Northern. Train we 363,540 lb. — 48.6% lighter than same capacity trai conventional construction.

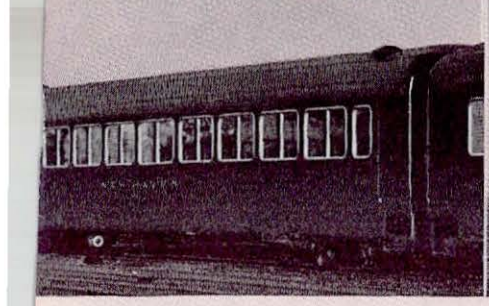
For faster speeds... better servic

modernize with USS

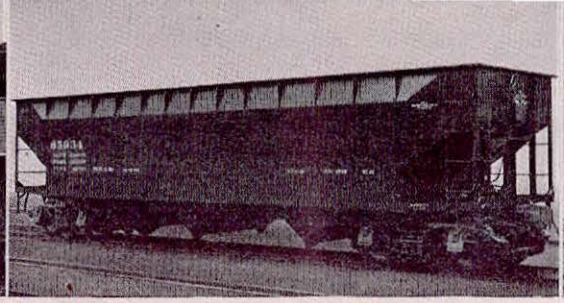


FABRICATION PRESENTS NO UNUSUAL DIFFICULTIES

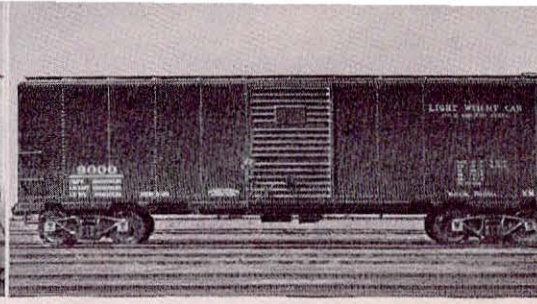
You are not asked to pioneer in applying these superior steels in your designs. The experimental period of fabrication with USS High Tensile Steels is over. Practically every question involving shop methods has already been answered. Suitable and economical procedures have been well established in the shops of leading railroads and car builders. We are ready to place this information freely at your disposal.



y of these De Luxe Coaches were built for the New k, New Haven & Hartford. Center sill of USS N-TEN, super-structure of USS COR-TEN made sible savings of 36,200 lb., about 26% in weight.



One of 2000 70-and 90-ton hopper cars built for the Bessemer and Lake Erie Railroad. USS COR-TEN used throughout, effecting a substantial increase in the ratio of pay load to dead weight.



An experimental box car that weighs 8,000 lb. less than the standard A.A.R. design. Car body is of USS COR-TEN. Weight of rolled steel parts reduced 27% by substituting USS COR-TEN for carbon steel.

...*increased earnings*

HIGH TENSILE STEELS

REDUCTION of dead weight is the basic idea behind the wave of modernization that is revolutionizing railroad equipment.

Engineers have known that with stronger, better steels they could build lighter equipment. They built heavy because they had to. The only way to combat terrific stresses and impacts, and to hold down maintenance was to use thick, heavy members. Conventional steels demanded it.

That time is past. Today USS COR-TEN, USS Stainless and other USS High Tensile Steels offer to the field of transportation the greater tensile strength, the increased toughness, and the greatly increased resistance to corrosion that make it possible to build equipment light without any loss in strength. There is no sacrifice of safety, no reduction in service-life.

What these superior steels can do to reduce dead weight—how they lower operating costs, increase traffic and likewise revenue is well demonstrated in the schedule smashing stream liners. And in freight equipment, hopper cars built 20% lighter with USS COR-TEN and hauling 7% more pay load than before have shown that investments in light-weight modern equipment are self-liquidating.

The rapid and steady increase in the use of USS High Tensile Steels is indicated by the equipment illustrated above. To learn how well these superior steels will fit into your rehabilitation and modernization program, how little they affect shop practice or increase cost, address Railroad Research Bureau, United States Steel Corporation Subsidiaries, Pittsburgh, Pa.

AMERICAN STEEL & WIRE COMPANY, *Chicago and New York* . . . CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago* . . . COLUMBIA STEEL COMPANY, *San Francisco* . . . NATIONAL TUBE COMPANY, *Pittsburgh* . . . TENNESSEE COAL, IRON and RAILROAD COMPANY, *Birmingham* . . . COLUMBIA STEEL COMPANY, SAN FRANCISCO, *Pacific Coast Distributors* . . . UNITED STATES STEEL PRODUCTS COMPANY, NEW YORK, *Export Distributors*

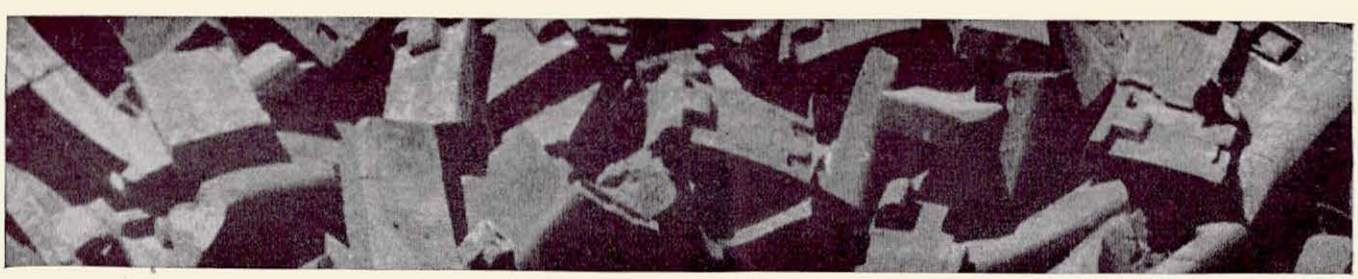
UNITED STATES STEEL

Only Slightly Worn *but*—

"The fact that a very large per cent of brake shoes in freight service are never worn out, but fail in large numbers before much shoe wear has developed is sufficient in itself to suggest that improvements in shoe design are not only desirable but necessary."

This quotation is from the A.A.R. Circular No. D.V. 846

The A.A.R. analyzes its troubles for the good of the industry. Are you taking advantage of their findings?



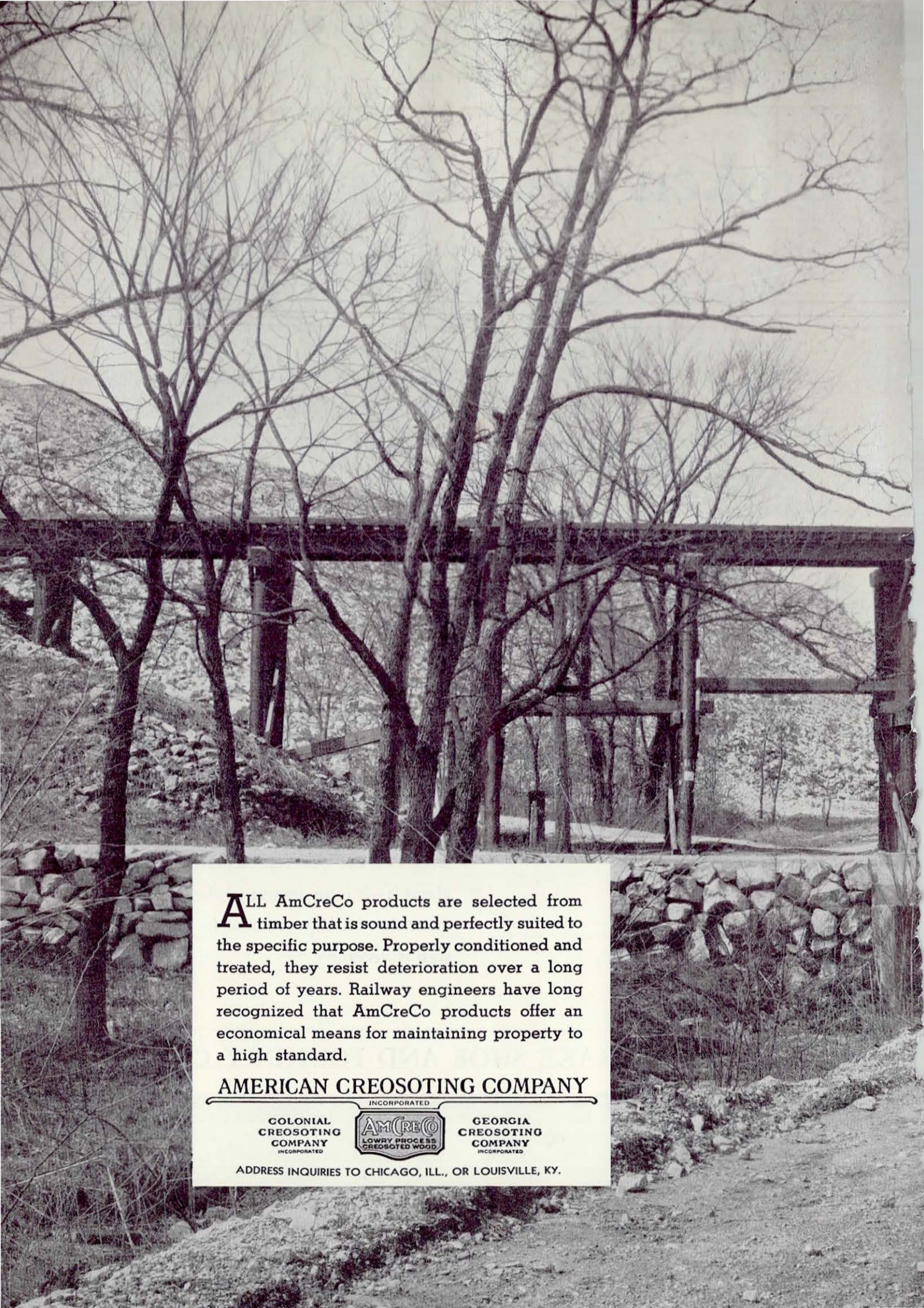
"Broken With Part Missing"

DATA compiled for 9 Class I railroads by an impartial committee show that 53 per cent of freight car brake shoes are removed because they are broken with part missing while they are still on the average 1" thick.

This record is bad, of course, but an even worse condition is the large number of shoes that are discarded because they are broken with part missing when they are *but slightly worn.* The new Duplane reinforced shoe, (A.A.R. Alternate Standard), answers the broken shoe problem.

If you are not already acquainted with this important improvement in brake shoe construction ask our representative to tell you about it—it is an answer to the A.A.R.'s statement that an improvement in brake shoe design is *necessary.*

THE AMERICAN BRAKE SHOE AND FOUNDRY COMPANY



ALL AmCreCo products are selected from timber that is sound and perfectly suited to the specific purpose. Properly conditioned and treated, they resist deterioration over a long period of years. Railway engineers have long recognized that AmCreCo products offer an economical means for maintaining property to a high standard.

AMERICAN CREOSOTING COMPANY

INCORPORATED

COLONIAL CREOSOTING COMPANY INCORPORATED

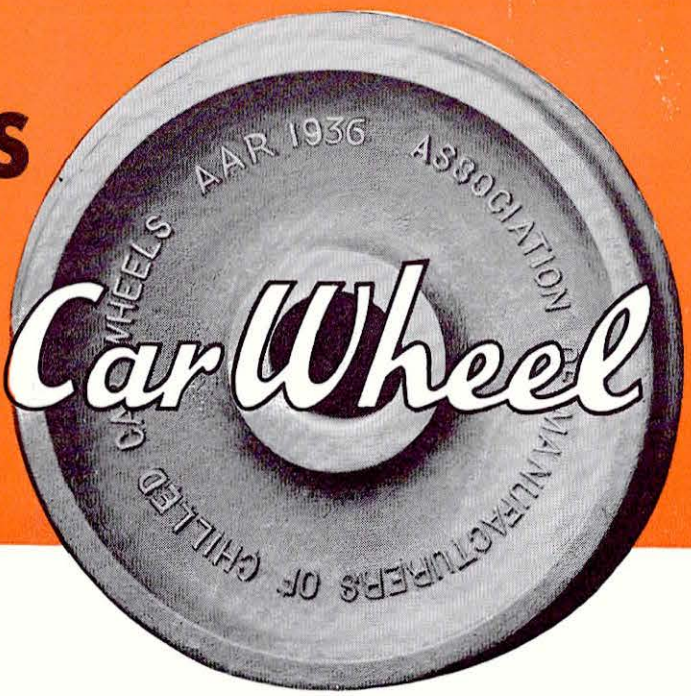
AMCRECO LOWRY PROCESS CREOSOTED WOOD

GEORGIA CREOSOTING COMPANY INCORPORATED

ADDRESS INQUIRIES TO CHICAGO, ILL., OR LOUISVILLE, KY.

ECONOMIC ADVANTAGES

FOUND IN THE USE OF THE Chilled Car Wheel



AMCCW

THE CHILLED CAR WHEEL definitely possesses the following economic advantages:

MEMBERS

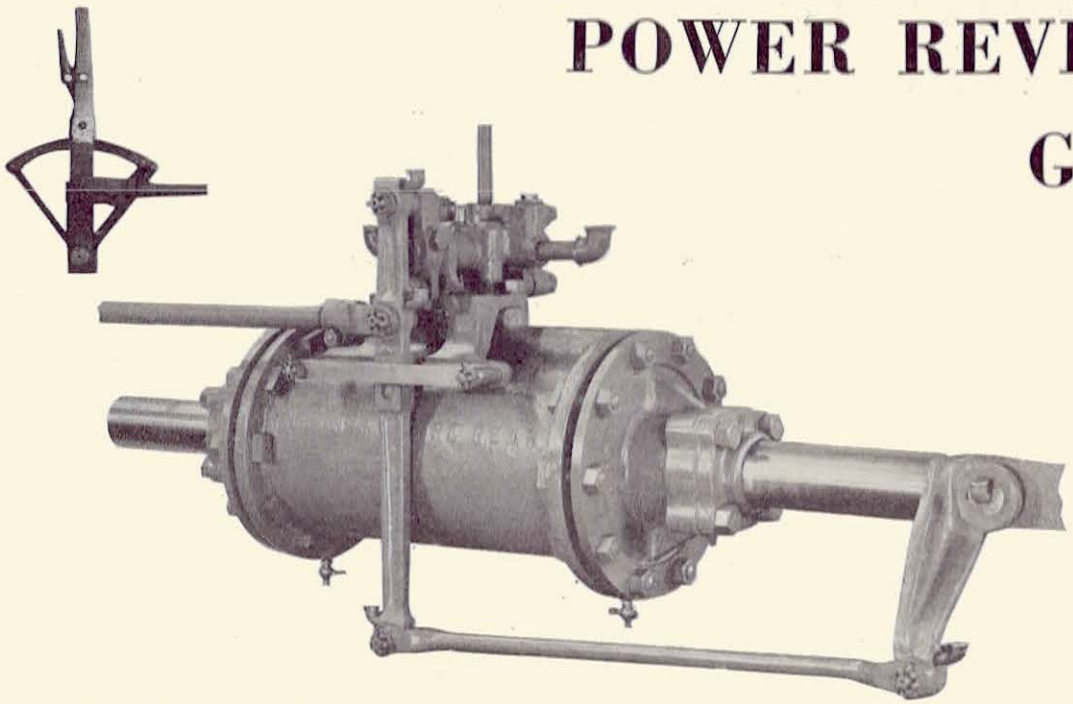
Albany Car Wheel Co.
American Car & Fdry. Co.
Bass Fdry. & Machine Co.
Canada Iron Foundries, Ltd.
Canadian Car & Fdry. Co.
Central Car Wheel Co.
Cleveland Production Co.
Dominion Wheel & Fdries., Ltd.
Griffin Wheel Co.
Hannibal Car Wheel & Fdry. Co.
Lobdell Car Wheel Co.
Louisville Car Wheel & Ry. Sup. Co.
Marshall Car Wheel & Fdry. Co.
Maryland Car Wheel Co.
Mt. Vernon Car Mfg. Co.
New York Car Wheel Co.
Pullman-Standard Car Mfg. Co.
Ramapo Fdry. & Wheel Works
Reading Car Wheel Co.
Southern Wheel Co.
Tredegar Iron Works

1. Important superior physical properties.
2. Guaranteed service.
3. Low first cost.
4. Low capital investment in wheels and shop machining.
5. Low storehouse and machining costs.
6. Accessibility of wheel foundries to all railroad centers.

Members of this Association will be glad to give you full information on any of the economical advantages mentioned.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
445 N. Sacramento Blvd. CHICAGO, ILLINOIS

Here is your BALDWIN POWER REVERSE GEAR



TRUNK TYPE GEAR
(Type "T")
as illustrated above has hollow extended piston rod—no guides or crosshead.

CROSSHEAD GEAR
(Type "C")
with conventional guides and crosshead can be supplied if desired.

Improved features, proper design and precision methods of manufacture insure dependability in operation and low maintenance costs.

Backed by more than 50 years experience gained since the first Baldwin power reverse gear was patented in 1882.

• • •

Valve and seat of non-corrosive alloy can be removed for regrinding at the bench. Spare valve and seat can be quickly applied, preventing costly detention in shops.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA

A wheel made of special composition metal and heat treated to produce a hard, tough, high tensile, wear-resisting tread.

A wheel that will carry heavy loads safely and with comparative freedom from tread injuries resulting from severe brake applications.

A wheel that has sufficient thickness of metal in the rim to permit several wears.

A wheel that will deliver dependable service under high speed locomotive tenders and passenger cars at a low cost per thousand miles.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

ALLIES IN YOUR BATTLE FOR LOWER OPERATING COSTS

RAILROAD MATERIAL — TRADE MARK — YOUNGSTOWN

In the YOUNGSTOWN organization three brigades of specialists are constantly co-operating with the Railroad Industry in its unceasing fight to eliminate avoidable expenses.

Youngstown Research Engineers are continually creating basic improvements.

Youngstown Metallurgists follow through to perfect their practical application.

Youngstown's Inspection Department operates under definite instructions that cost of manufacture must always be held secondary to the quality and complete dependability of the product delivered.

SPIKES
TIE PLATES
SHEETS
PLATES
SHAPES
BARS
ROOFING SHEETS
SIDING SHEETS
PIPE
ELECTRIC CONDUIT
WIRE
BARBED WIRE
FORGED STEEL UNIONS
SEMI FINISHED STEEL
ALLOY STEELS
YOLOY

THE YOUNGSTOWN SHEET AND TUBE CO.
Manufacturers of Carbon and Alloy Steels
General Offices - - YOUNGSTOWN, OHIO
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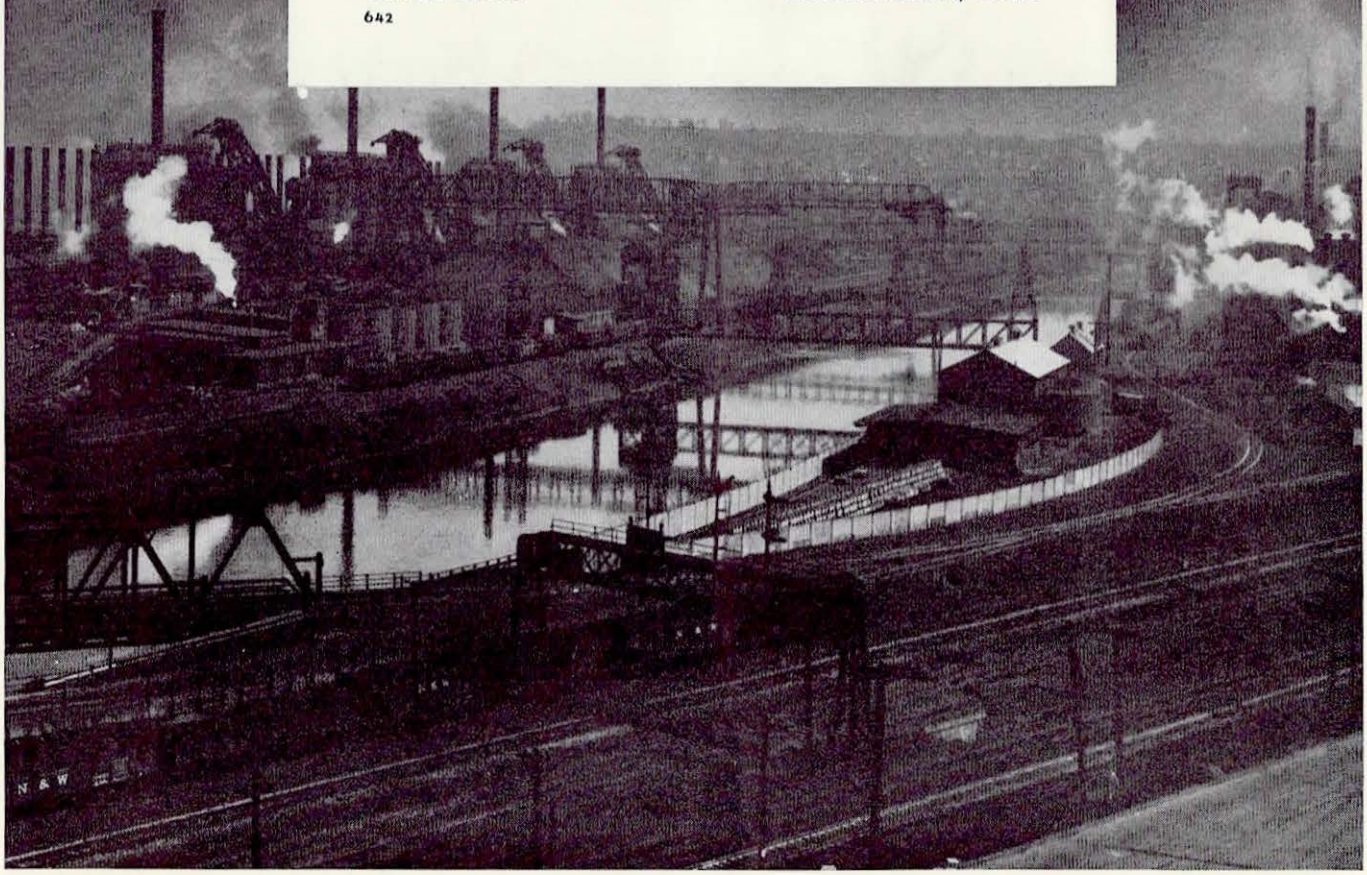
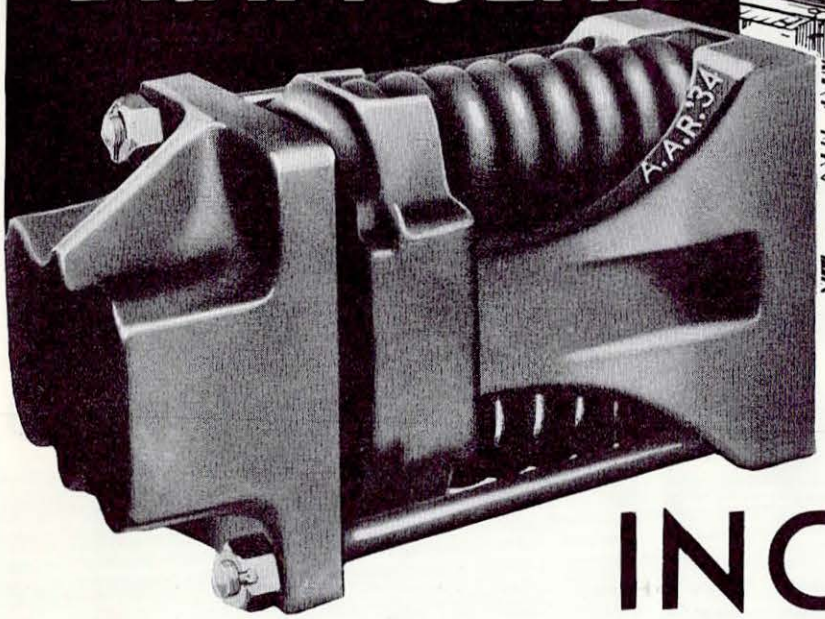
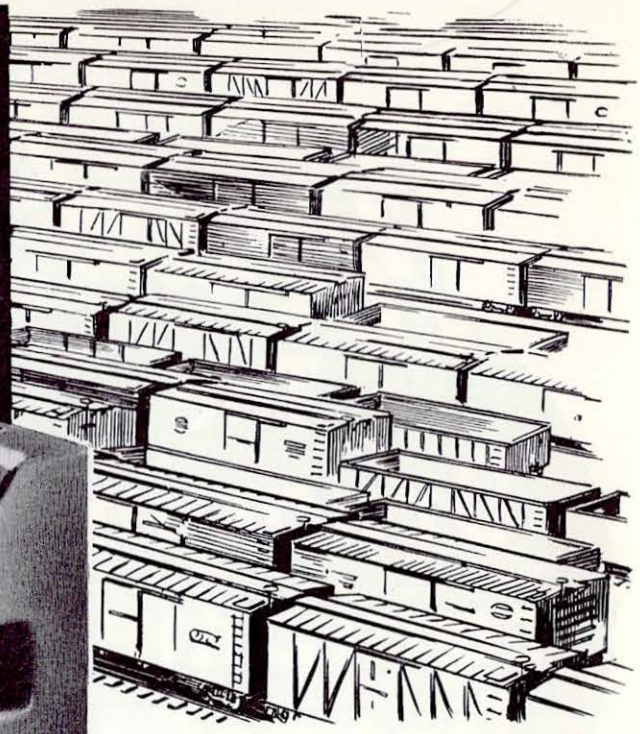


NATIONAL
NACO STEEL
DRAFT GEAR





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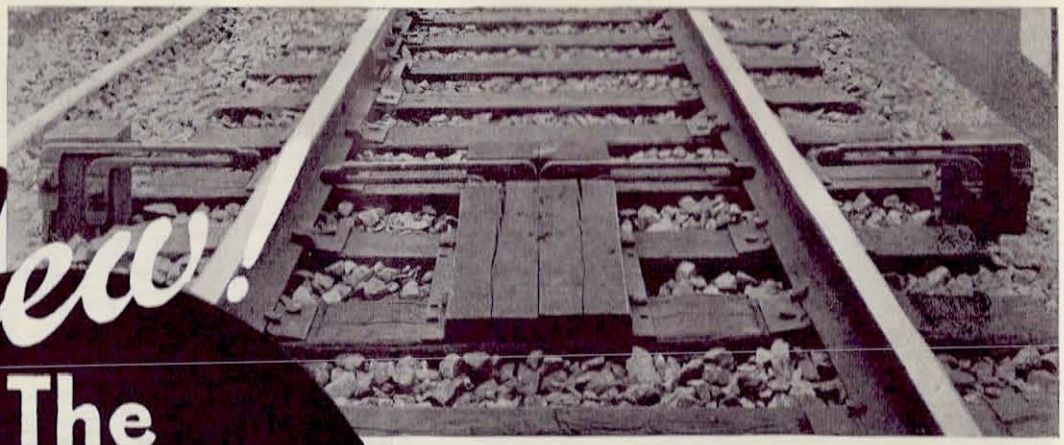

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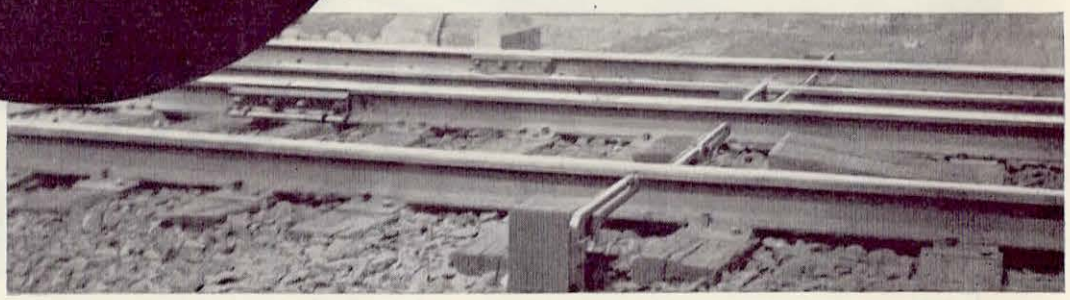

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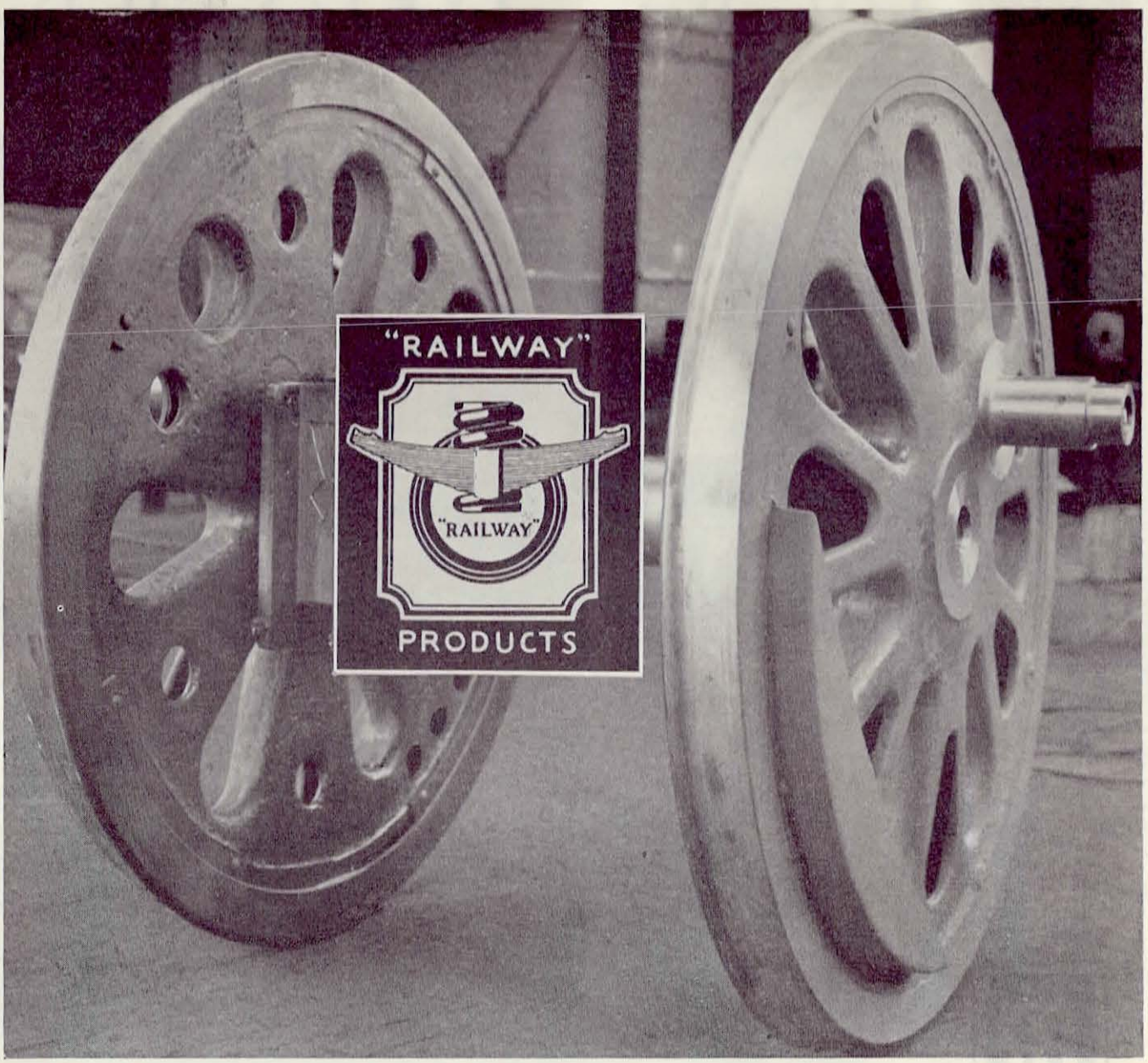

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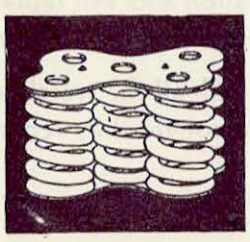

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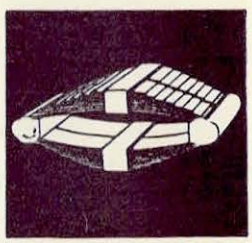

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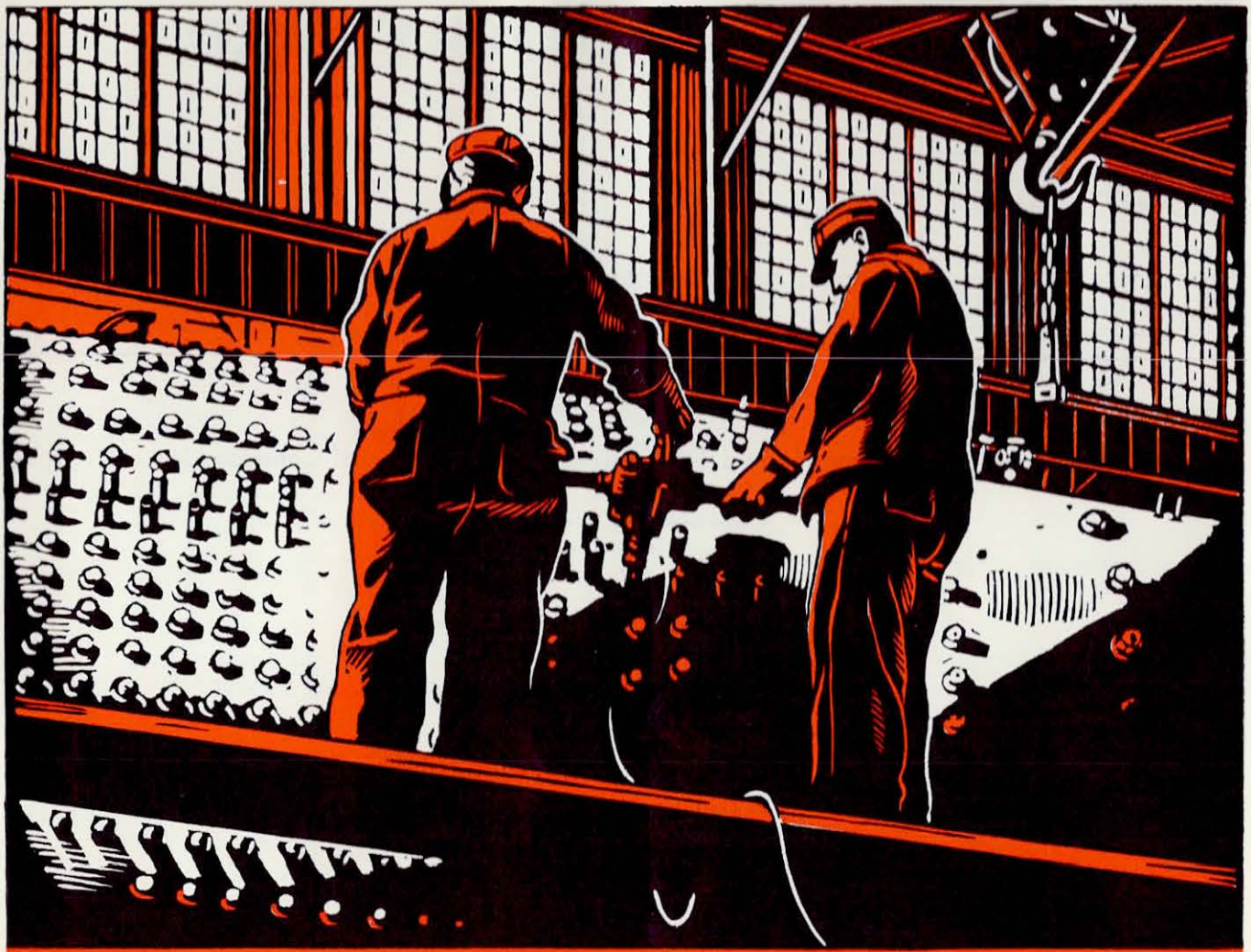

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RAILWAY AGE

Railroads, Politics and Recovery

We have long been told that national political campaigns hurt business. The one now drawing to a close has involved issues affecting business more than any other that ever occurred, but throughout it business has been improving. The national conventions were held in June. A normal seasonal increase in freight loadings between June and October is 4 per cent. This year it has been about 20 per cent. Both New Dealers and anti-New Dealers predict that if their opponents win next week it will hurt business. This paper predicts that for at least a year after the election business will continue to improve regardless of which side wins. This prediction is based upon the belief that the recovery thus far attained has been due principally to the same fundamental causes that have terminated previous depressions.

Human Nature Responsible for Economic Fluctuations

There are laws of human nature, and they are principally responsible for the great economic fluctuations that occur. Mass optimism causes booms. Booms inevitably collapse, and mass pessimism follows and protracts the resulting depressions. But during depressions there are millions of business men who are striving to restore business to a profit basis. As they restore their own businesses to a profit basis and begin to increase their buying, mass optimism begins to replace mass pessimism and recovery gets under way. It began in every important country in the world in the latter part of 1932. It has been retarded more by government policies in this than in any other country, but it has made unbroken progress here now for fifteen months. The result of the election probably will affect the momentum of its improvement, but it has now acquired so much momentum that it will continue for some years unless arrested by unwise government policies. Government policies may stimulate or minimize booms, they may stimulate or retard recovery, but in every country where business men have any real freedom booms, depressions and recovery are caused principally by the efforts of business men to increase, maintain or restore profits.

The "Tough-Minded" versus the "Tender-Minded"

It will not be the immediate but the long-range effects of this election that will be important. Two plainly opposed systems of economics are struggling for the mastery in this country. An eminent American psychologist divided people into the "tough-minded" and the "tender-minded." The tough minded, because of their very nature, favor governmental and economic systems of freedom under which each of them will have as much opportunity as anybody else to get along in the world. They have dominated in the affairs of this country from the beginning. They boldly pioneered across the ocean from Europe, kept on pioneering westward until they had settled and developed the country agriculturally and then turned to pioneering in industry until they built up the greatest industrial system in the world.

The tender-minded are not confident of their own strength. They dread equal competition with the tough-minded and want help in meeting it. In due course in every country they turn to government for assistance because it seems to have more power to assist them than any other agency and because they believe that, in democratic countries, they can use their votes to compel it to assist them. They become advocates of socialistic policies in the belief that such policies will cause changes in the distribution of wealth and income that will inure to their advantage. These tender-minded people are found in all ranks of society from the panhandler who begs on the street for a dime to the business man who advocates expenditures on in-

land waterways to enable him to ship his freight largely at the cost of the taxpayers.

The tough-minded and tender-minded classes of this country are more nearly aligned against each other in the present political campaign than ever before in its history. The outcome of their struggle next Tuesday will be important. But their struggle will not end next Tuesday. It is essentially the class struggle of European countries transferred to the United States, and it will be continued by future generations. The election next Tuesday will, however, determine whether the trend in government during the next four years will be toward or away from inflation and state socialism. If it is toward inflation and state socialism it will be menacing to business and all classes of the people. If it is away from inflation and state socialism the next four years probably will be the first part of the period of greatest prosperity in the country's history.

Seven Years of Depression

Meantime it is interesting on the verge of the election to recall that the collapse of the New York stock market, which gave warning of the bursting of the great boom and the beginning of the great depression, occurred just seven years ago this month. This depression having now lasted seven years has already been the longest, as well as the most severe in history.

If we had now had complete recovery business would be as good as before the collapse of the stock market in 1929. The fact that freight loadings are still 30½ per cent smaller than in October, 1929, is sufficient proof that there has not been complete recovery. Statistics are published showing that "industrial production" has been restored to almost a pre-depression basis. But railway freight loadings are a much better measure of the total volume of production and distribution than industrial production. Statistics of industrial production do not include construction, agricultural production, or many other kinds of activity. Freight loadings are a measure of all kinds of production and distribution. With freight loadings still only 70 per cent as large as in 1929, it is evident that the total volume of production and distribution must still rise about 40 per cent before recovery will be complete.

Railroads in 1929 and 1936

How far have the railways "come back"? They are doing better than in any year since 1930. Their freight traffic did not become larger this year than in 1931 until in September, and consequently their gross earnings thus far this year have been smaller than in 1931; but because of reductions in operating expenses their net operating income has been larger. In the first eight months of 1931 it was $351,000,000, and in the first eight months of 1936 it was $365,000,000. The net operating income earned by them in the last one-third of the year will largely exceed that earned in the last one-third of 1931, making the total for the year substantially larger than for any year since 1930.

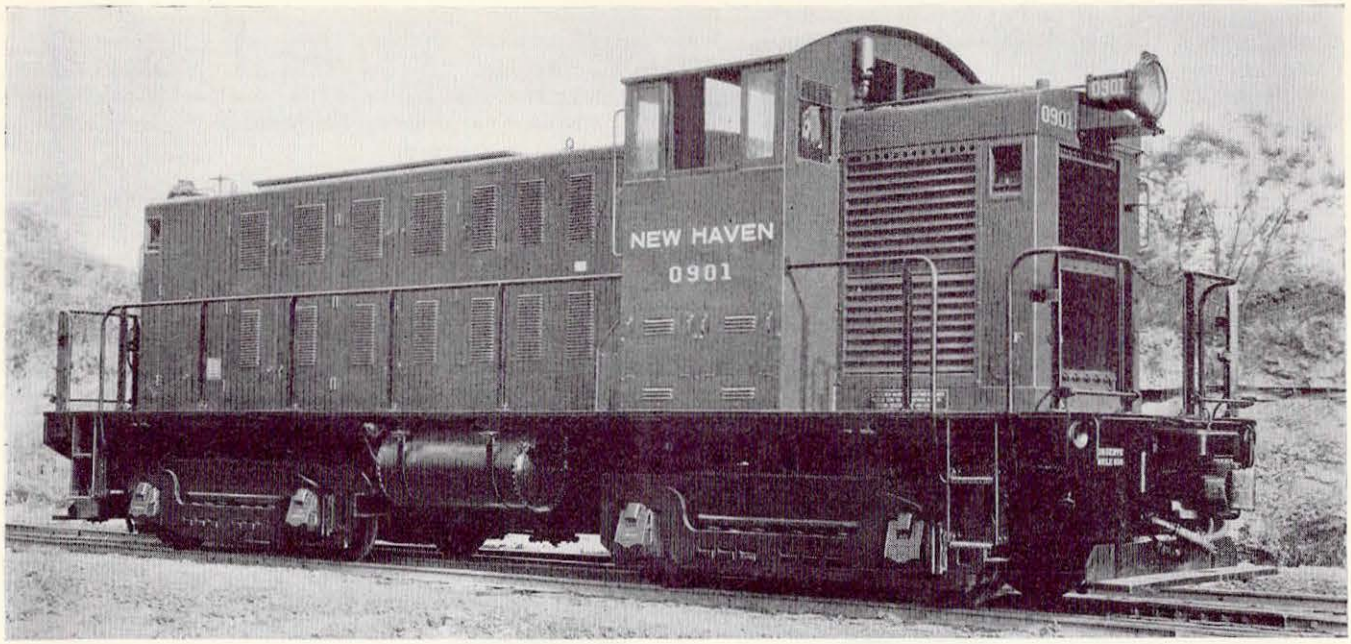
How well have they done thus far this year as compared with how they did in 1929 before the stock market boom collapsed? In the accompanying table are given comparative statistics for the first eight months of 1929 and 1936, excepting for freight car loadings which are available and are given for approximately ten months. Freight loadings have been 34 per cent less than in 1929. Gross earnings in the first eight months of the year were 39 per cent less than in 1929; operating expenses 37 per cent less and the number of employees 37½ per cent less.

	8 mos. 1929	8 mos. 1936	Per Cent Decrease under 1929
Freight Car Loadings (10 mos.)	43,465,077	28,644,068	34.1
Gross Earnings	$4,213,688,666	$2,573,257,647	38.9
Freight Earnings	$3,186,785,711	$2,093,261,772	34.3
Passenger Earnings	$595,149,592	$270,876,889	54.5
Total Operating Expenses	$3,035,101,917	$1,916,048,550	36.9
Taxes	$270,647,132	$204,542,690	24.4
Net Operating Income	$828,394,791	$364,697,978	56.0
Number of Employees	1,681,252	1,050,866	37.5
Purchases from Manufacturers	$920,513,000	$430,564,000	53.2

Two Economic Laws of Railroading

The close correspondence between the declines in gross earnings and in the number of employees between 1929 and 1936, in which average hourly wages were about the same, is another striking illustration of a fact often emphasized in these columns—viz., that gross earnings determine the total payroll almost regardless of all the legislative and labor union efforts made to repeal the laws of economics. Net operating income was 56 per cent less and purchases from manufacturers 53.2 per cent less than in 1929. Here again is illustrated a fact often emphasized in these columns—viz., that the volume of railroad buying from the manufacturing industry is determined by the amount of railway net operating income earned. The railroads made 60 per cent larger purchases from the manufacturing industry in the first eight months of 1936 than in the corresponding months of 1935. This was rendered possible by and due to the increase in their net operating income within the last year; and the relationship between their net operating income and their purchases during the first eight months of 1936 was almost the same as it was in the first eight months of 1929.

Business is coming back. In October, 1934, freight loadings were 54 per cent as large as in 1929; in October, 1935, they were 62 per cent as large; in October, 1936, they have been 71 per cent as large. The railroads are coming back with business and by the increases in their employment and buying and the good service they are rendering are helping business to come back. The results of the election will be just as bad or good for the railroads as for business because the railroads and other kinds of business are interdependent and, with respect to government policies, the railroads and other kinds of business will in future be in the same boat and either subject to socialistic policies that will undermine both or subject to policies of a non-socialistic system which will promote prosperity of both and of their employees.



One of the New Haven Diesel-Electric Switchers, Five of Which are Powered with Ingersoll-Rand Engines and Five with Cooper-Bessemer Engines, All Have General Electric Electrical Equipment

New Haven's Ten Switchers Involve Unusual Considerations

Diesel-electric units, built by General Electric with Cooper-Bessemer and Ingersoll-Rand engines, designed to permit interchange of prime movers and major accessories

THE six-wheeled steam switching locomotives (Class T-2-b) of the New York, New Haven & Hartford are now over 20 years old and many are approaching the stage when extensive general overhaul will be necessary. In 1931 the New Haven purchased a 100-ton, 600-hp. Deisel-electric switcher the performance of which has been satisfactory, resulting in substantial economies. For these reasons the New Haven decided to purchase 10 additional Diesel-electric switchers for use in terminals where 24-hr. service can be obtained from the new power.

Specifications on the basis of a Diesel-electric switcher to take the place of and do the work of a steam locomotive of the T-2-b class, as well as part of the work of a Y-3 class locomotive, were prepared and submitted to all interested bidders. The T-2-b locomotives weigh complete 119 tons, with 72 tons on drivers. Calculations showed that an 80-ton, 450-hp. Diesel-electric locomotive would do all the work in the switching speed range which a T-2-b steam engine would do; experience with the 100-ton, 600-hp. Diesel-electric switcher had already shown that a locomotive of this weight and power was capable of performing the work in the slow-speed range of an eight-wheel Y-3 locomotive with a total weight of 189 tons and a weight on drivers of 110 tons. Hence to anticipate future requirements and to provide a margin of capacity over present needs, the stipulation that the new locomotives should be able to do some Y-3 work was added to the specifications.

In order to insure the widest possible utility, certain maximum allowable T-2-b dimensions were given, superimposed on the clearance diagram for equipment operating in the electric zone, whichever was limiting. Total weight was specified as not to exceed 100 tons, all on drivers, and wheel loading and spacing to permit operation of the Diesel-electric switcher on any structure suitable for a T-2-b was given. The new locomotives, therefore, would be able to operate anywhere that a T-2-b locomotive is permitted, and, with certain restrictions regarding minimum curve, in third rail territory also.

Further along the line of maximum utility the locomotives were to be arranged for both passenger and freight switching.

A single Diesel-engine-generator set was specified as preferred, in view of the advantages of simplicity, accessibility, and fewer parts to service and maintain.

One of the first major problems presented was the question of maximum limiting speed of the locomotives. Heretofore, maximum allowable speeds of Diesel-electric switchers were in the 35 to 45 m.p.h. range, being limited by the traction-motor armatures. When the idea of limiting the speed of the new locomotives to 25 m.p.h. was first proposed, there was considerable doubt about the practicability of such a scheme. The advantages,

however, became more and more obvious as the situation was analyzed. In return for sacrificing the upper speed range, of say 25 to 40 m.p.h., approximately 10 per cent additional performance of the locomotives was made available in the slow speed switching range. Furthermore, assuming the locomotives were good for speeds from 25 to 40 m.p.h., the loads they could handle at these speeds would be very small due to the primary limitation of horsepower available. In addition, it was found that electric switchers in the electrified yards of the railroad had for years been limited to 20 m.p.h., and to clinch the argument, there was a general timetable rule limiting the speed of all switchers, either steam or electric, to 20 m.p.h. It is only fair to state that the motive-power people had more hesitation in proposing a so-called slow-speed locomotive for switching service than the operating people had in accepting it!

The second group of questions had to do with various entirely new features proposed for the locomotives. One was all-welded construction. While this had been looked upon favorably as a future development it seemed rather radical. When the advantages of such fabrication, if successful, in reducing maintenance trouble and expense were taken into account, it was decided to accept welded construction for both trucks and cabs.

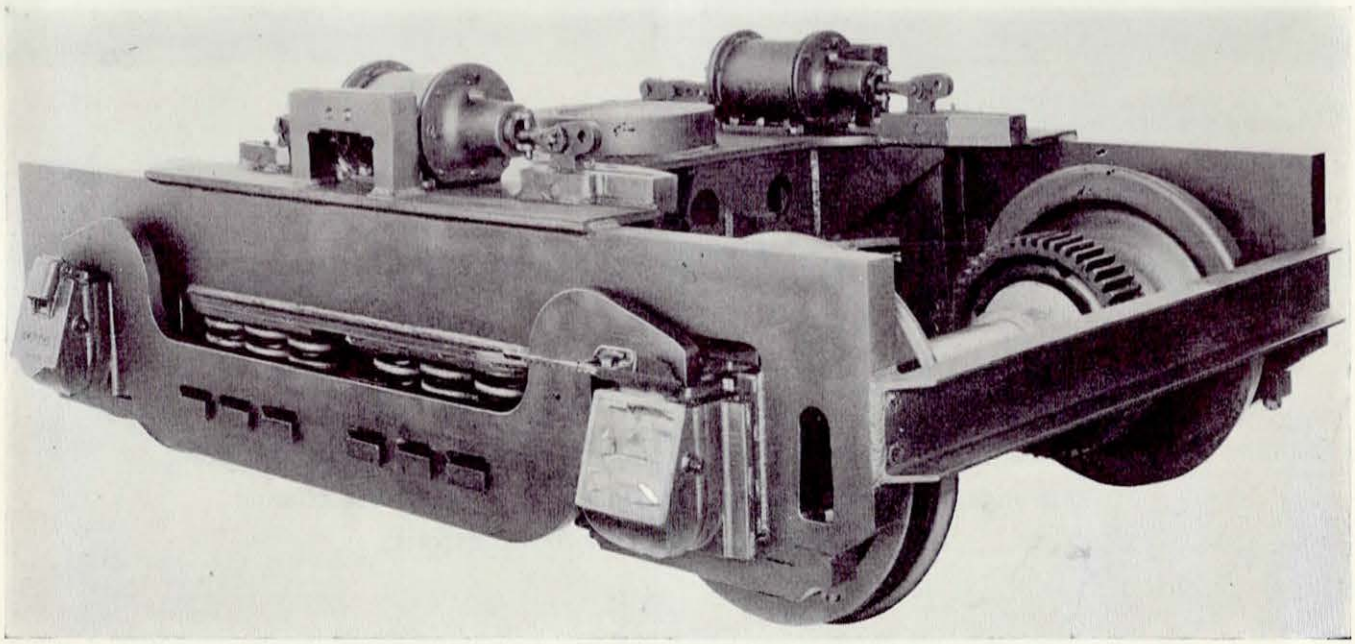
Another of the new features proposed was the use of axle hung traction motors geared to the axles by means of integral double reduction gearing. Motors of this type had been built previously for street car service, but not for heavy locomotive use. There were, however, three factors which favored the proposed motor—increased efficiency by reason of high motor speed; small size and light weight; the fact that the intermediate gear would be built into the motor and pinion housing in such a way that mounting of the motor in the truck and removal therefrom would conform in all respects to standard practice.

Another new item proposed was the use of a high-speed, light-weight, water-cooled motor-driven air-compressor set making use of two small opposed cylinders and operating at a higher speed than similar compressors in the past.

Another proposal was the elimination of any auxiliary generator and the employment of the main generator for auxiliary power at both idling and full speeds of the Diesel engine. It seemed that the advantages of this would more than outweigh the small additional complication involved in arranging some of the auxiliaries for double voltage operation.

The last problem of importance was the selection of the Diesel engine. Two different makes of engines had been proposed for these locomotives—one a 10½-in. bore by 12-in. stroke, eight-cylinder, four-cycle, solid-injection, non-supercharged Cooper-Bessemer engine, rated at 660 b.hp. at 750 r.p.m.; the other a 10-in. bore by 12-in. stroke, eight-cylinder, four-cycle, solid-injection, non-supercharged Ingersoll-Rand engine, rated 600 b.hp. at 750 r.p.m. Overall dimensions of both engines, with respect to locomotives mounting, were comparable, and construction of the engines while differing in details was in general similar.

Five engines were ordered from the Cooper-Bessemer Corp. and five from the Ingersoll-Rand Co., the General Electric Co. building the locomotive portions. It was desired to co-ordinate the engines and engine auxiliaries as far as possible. Final design of the locomotives, therefore, was undertaken along these lines and the result has been 10 locomotives exactly alike in all respects except for Diesel engines; Diesel-engine co-ordination has been carried out to the extent that it is possible to remove an engine of one make and substitute one of the other make in the same locomotive without changes in connections or alterations in mounting or equipment.



One of the Four-Wheel Trucks, of Fabricated, Welded Construction with the Weight Carried on Coil Springs

Co-ordination was carried out along three lines. One was the determination of the maximum operating characteristics of the two engines from a study of which could be designed a common set of engine auxiliaries and secondary apparatus, including parts of the electrical equipment; another was the co-ordination of all operating procedures so that with minor variations the same set of instructions could be used with locomotives having either make of engine; the third was the actual employment for both engines of the same auxiliary parts.

One of the first major considerations was the design of a generator which with its field-control equipment would have a speed-torque characteristic suitable for

both engines. Each builder, therefore, submitted a permissible speed-torque curve for his engine and a generator was designed with acceptable characteristics over the entire speed range. Governed speed at full load was set at 770 r.p.m. for each engine, the speed control equipment being designed to maintain speed at full load just under this, or at 750 r.p.m. It can thus be seen that there will be no conflict between engine governor and electrical governor.

To design suitable starting characteristics for both engines, the engine builders furnished information regarding maximum torque required at breakaway to overcome compression at 32 deg. F., torque at minimum firing speed at 32 deg. F., and minimum firing speed in r.p.m. With this information and knowing the battery characteristics, the starting winding on the generator could be correctly designed and proportioned for starting both types of Diesel engines.

Rotation as finally agreed upon for both engines was clockwise facing the generator end.

Mechanical design of the generator and coupling as they affected the rotating systems of the engines was given very careful attention. The final design incorporated WR^2 and stiffness factors acceptable to both engine builders.

Idling speed was finally decided upon as 300 r.p.m. at full auxiliary load of 40 hp.

A new flexible coupling was designed for use with both engines. This coupling employs steel discs which transmit torque in compression and allow slight movements longitudinally by bending. Engine flywheels to which the couplings were attached were different, but were made suitable for attaching the same generator fan.

After collecting from each engine builder data regarding heat rejection to cooling water, engine outlet water temperature water pump delivery and head, etc., a water cooling system was designed which was suitable for both engines and which had incidentally an inherent capacity suitable for the larger engine operating continuously at full load in an ambient temperature of 100 deg. F.

A serious attempt was made to use the same water pump on both engines, but after full investigation this was abandoned and each engine was equipped with its own type of pump.

The same water temperature indicators with the same markings were designated as were identical thermostat switches set at the same cut-in and cut-out points. Similar data regarding lubricating oil were collected, and provisions made in arrangement of water radiators for the inclusion of the necessary oil radiators.

Since one engine used a nominally constant lubricating oil pressure system and the other a variable system there was some question as to the co-ordination of the lubricating-oil pressure gages. This was answered by using the same gage marked with the minimum allowable oil pressure at idling which was determined to be 20 lb. for both engines.

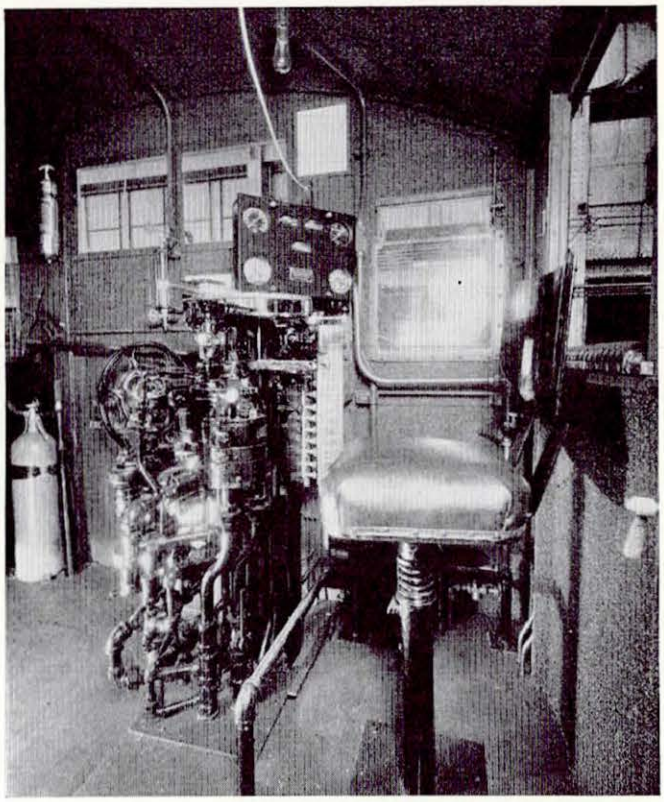
Two Nugent lubricating-oil filters were installed for each engine. The filters are connected in parallel, and handle the entire lubricating-oil circulation.

Low-pressure fuel-oil systems were completely co-ordinated, and consist of a motor-driven transfer pump, a Purolator filter with .003-in. spaces on the suction side of the pump and Purolator on the discharge side, with necessary trip, relief valve, pressure gage, etc. While it was the railroad's desire to conform to its other Diesel-electric equipment and maintain 35 lb. pressure on the discharge side of the transfer pump, it was necessary to drop this to 10 lb. for one make of engine on account of characteristics of the high-pressure pump.

No co-ordination was attempted on the high-pressure fuel systems of either engine, partly because of the inherent differences between the so-called "common rail" and "jerk pump" systems, and partly because it was not desired that changes be made in fundamental parts of the engines.

Mufflers are made integral parts of each engine both for the sake of inter-changeability of the Diesel engines as between locomotives and to keep mufflers off the top of the locomotive to improve visibility from the cab. Suitable provisions were made in the hood around the exhaust exit so that the exhaust stacks of either engine were equally well accommodated and were hidden from view behind a low collar which conforms to the contour of the hood.

Four Air-Maze intake air filters of the same type and size were used on each engine. The housings, however, on the two were of different size and arrangement; on one the filter units themselves extended the length of the engine and came out close to the upper row of louvers in the hood; on the other there was a form of air duct at each end leading to a common housing in which were the filter units. Since this engine is narrower than the other it was necessary that filler pieces be fitted in between the louvers and the face of the ducts; these were fastened to the two hood doors opposite. To carry out the co-ordination scheme consistently, the corresponding hood doors were drilled and fitted with bolts on locomotives having the other kind of engine though of course, the filler pieces were installed only on the engine requiring them.



The Operator's Control Station in the Locomotive Cab

In order to gain a direct operating comparison between two types of speed control equipment, the Woodward governor was furnished on one type of engine, and a mechanical type with servo-motor on the other. Both engines were equipped with overspeed trip, lubricating-oil pressure relay to protect against low oil pressure, and solenoid-operated fuel shut-off device. While most of this equipment was different on the two engines, never-

theless the methods of operation were identical. The throttle mechanism was made identical both as regards operation and adjustments.

One particularly important problem of co-ordination arose because of the fact that one engine weighed roughly 7,000 lb. more than the other and that one engine had a dry base and the other a sump base. Since both engine-generator sets in the locomotive had to be identical as to number, size and spacing of bolt holes, method of mounting, etc., the problem was settled by re-designing the sub-base of the lighter engine, making the bottom of a plate 2¾ in. thick. This new sub-base made up nearly 6,000 lb. of the 7,000 lb. difference in weight. The fact that this same engine used separate mufflers attached to it instead of the combined manifold and muffler arrangement still further reduced the difference, so that the weight discrepancy factor disappeared.

The sub-base of the engine designed for an outside sump was redesigned to incorporate in it a lubricating oil reservoir of 100-gal. capacity. This eliminated the necessity for a separate sump tank for this oil and made it possible to design similar filling, draining and gaging facilities for the two makes of engines.

It was the railroad company's desire that the crankcase breather pipe for both engines open directly into the engine compartment without having it piped underneath or into the air intake system. Hence each engine has a 2-in. pipe fitted with a Vortex filter cap.

One of the most detailed parts of the co-ordination was the arrangement of all fuel-oil, lubricating-oil, water and drain lines on each engine so that they would connect with a common system of locomotive piping. The center line of the crankshaft and the bolting face of the generator coupling were taken as references for locating pipe connections. While doing this has resulted in both engine builders having to run extra piping on their engines, the net effect has been a uniform arrangement of locomotive piping.

Trucks

Perhaps the most noteworthy feature of the mechanical structure is the all-welded truck construction, including the truck frames. These trucks are built up of structural shapes and plates knit together by heavy fillet and plug welds. The true test of their value comes in a severe derailment, in which one of these locomotives has already been involved through no fault of its own, and these trucks have proved themselves less subject to damage than those of other construction.

The weight of the locomotive is carried entirely on nests of coil springs mounted between the truck frame and equalizers. The construction is simple and the riding qualities of the locomotive exceptionally good. Additional features are the combined side-bearing and locking arrangement, and the truck swivel-limiting member which is attached to the front cross tie, contacting pads on the draft-gear housing. Lateral thrust of the axle is taken by thrust blocks mounted in the journal boxes opposite the ends of the axle.

A feature of the brake work is the provision for partial brake-travel adjustment by changing the position of the upper end of the dead lever which is on top of the truck and accessible without a pit. Further adjustment is provided by the usual turnbuckle arrangement behind the equalizers.

The wheels are standard 33-in. tender wheels, thus lowering wheel costs. Journals are the collar type, 6½ in. by 12 in.

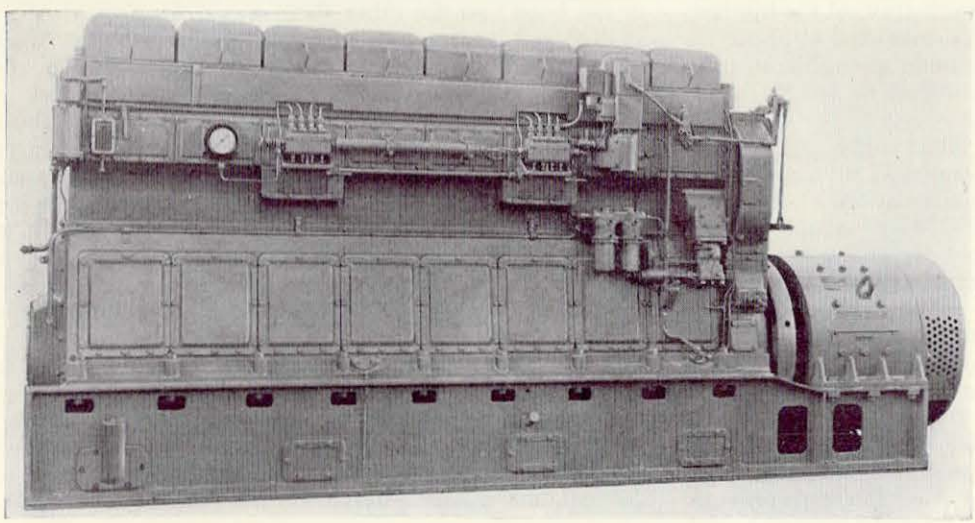
Underframe and Cab

The underframe is built up around a main slab 37 ft.-11¼ in. by 117 in. by 1½ in. forming the platform and mounted on two 37-ft.-7½-in. by 10-in. by 6½-in. center sills, running the entire length and forming a stiff backbone for absorbing buffing shocks as well as supporting the main items of equipment. Bumper beam, box structure for reinforcing the ends, draft gear housing, bolster plates, center bearings and buffers are of wholly fabricated welded construction.

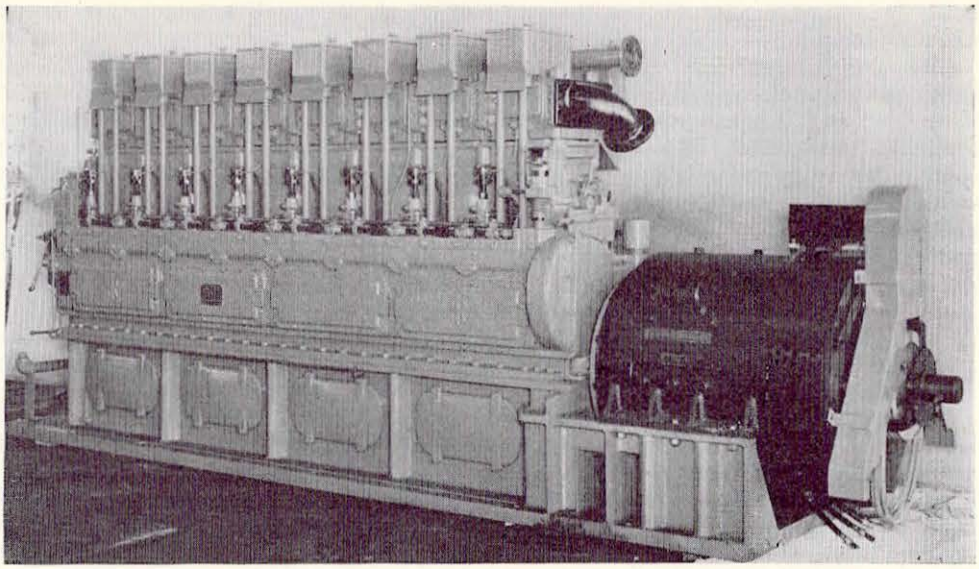
The cab and hood are of welded construction throughout. The section of the hood over the engine-generator set is removable and furthermore may be removed without disturbing any of the major piping. For minor work on top of the engine, a hatch is provided in the roof.

Equipment Layout

Accessibility of the equipment was one of the major objectives of the design, since accessibility goes a long way toward assuring low maintenance costs. The following points are of especial interest: Radiator sections can be removed singly from the platform. Radiator blower motor is reached from inside the radiator compartment and lifted out through the fan cone; the radiator compartment is reached through a door in operating cab. Distributing valve is mounted in the radiator compartment and feed valves in the operating cab. Contactors, relays, reverser and other control apparatus are reached from the operating cab through folding doors and resistors from the generator compartment. Batteries are reached from the ground through drop doors on the sides of the operating cab. The generator is in a separate compartment from the Diesel engine and is



Five of the Locomotives Are Equipped with Eight-Cylinder Cooper-Bessemer Four-Cycle Diesel Engines Having 10½-in. by 12-in. Bore and Stroke and Developing 660 Horsepower at 750 R.P.M.



One of the Five 600-Hp. Eight-Cylinder, Four-Cycle Ingersoll-Rand Engines Showing the Welded Steel Sub-Base and Generator Mounting. These Engines Develop Their Rated Horsepower at 750 R.P.M.

reached through hinged doors from the platform. All sides of the compressor are accessible through doors in the hood. Access to the entire length of the engine from top to bottom on both sides is provided by a series of hinged doors along the platform.

Operating Cab and Control Station

Particular pains were taken in laying out the control station so as to provide greatest convenience for the operator and best possible visibility. To this end, a complete dummy cab and operator's position were set up in the early stages of the design and apparatus, controls, seat, windows, etc., readjusted until it was felt the best possible arrangement had been achieved. The controls are convenient regardless of direction of operation. The operator can look across the top of either hood and see cars or locomotives on the other side, a real advantage in yard work. By putting the radiator ahead of the operating cab, no sacrifice in visibility is made and the operator is given greater protection in case of collision.

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The eight-cylinder Cooper-Bessemer engines are the type G-N8 four-cycle arranged in line. They have 10½-in. bore by 12-in. stroke cylinders, rated at 660 b.hp., continuous at 750 r.p.m. They are of the dry base type, carrying a structural steel sub-base, into which is built a lubricating-oil sump tank. This sub-base maintains accurate alinement of the engine and generator. The cylinder block and bottom of the crank case are cast in one piece, with removable alloy-iron cylinder liners, having top and bottom joints sealed water-tight by round rubber grommets held in turned recesses. The cylinder heads are individual castings, in which fuel nozzles, relief valves, intake and exhaust valves are all mounted and quickly accessible. The engines are equipped with aluminum pistons and 7½-in. diameter crank shafts, providing a combination which eliminates torsial vibration of any consequence within the operating range of the engine. The idling speed of these engines is 300 r.p.m. The connecting rods are high-tensile drop forgings of I-beam section, drilled full length to provide pressure lubrication to the wrist pins. The connecting-rod bearings are removable babbit-lined steel shells at the wrist-pin end and at the top half of the crank-shaft bearing. The bottom half of the crank-shaft bearing is a babbit-lined steel connecting-rod cap. The inlet and exhaust valves, one to each cylinder, are operated by forged rocker arms and short push rods, the lower ends of which rest against hardened cup blocks carried in guides with hardened rollers.

The injection system is the standard Cooper-Bessemer atmospheric-relief type of constant-pressure system, operating at maximum injection pressures of approximately 7,000 lb. and an idling injection pressure of approximately 4,000 lb. The cam-shaft drive, which also serves as the drive for all auxiliaries, is on the fly-wheel end of the engine and consists of a roller chain. The entire engine is enclosed, providing a dust-proof arrangement. The auxiliaries consist of a centrifugal water pump and rotary lubricating-oil pump, in addition to the main fuel pump. There is no drive taken off the forward end of the engine, the thrust bearing being applied at that end. The engines are not equipped with torsional vibration dampeners, as they are unnecessary with this combination of crankshaft and light reciprocating weights.

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Five of these locomotives are equipped with Ingersoll-Rand railway type Diesel engines of the vertical, trunk-piston, single-acting type, operating on the four-stroke cycle with direct fuel injection. The cylinders, eight in line, are 10-in. bore by 12-in. stroke, and the engines are rated at 600 hp. at 750 r.p.m. The engine sub-base, which supports the engine and generator, is of welded steel construction, extending the full length of the engine, and forms an oil sump for the engine. The cylinder block and upper portion of the crankcase is cast in one piece, with removable cylinder liners. The crank shaft is a one-piece forging, with main bearings 6¼ in. in diameter, drilled to provide passage for the lubricating oil to the main and crank-pin bearings. The crank shaft is counterbalanced. The connecting rods are one-piece drop forgings, with a solid eye at the piston pin end. The connecting rods are drilled for wrist-pin lubrication. The wrist-pin bearing in the connecting rod is a bronze-lined steel shell, pressed into the eye. The bearing at the crank-shaft end is an interchangeable babbit-lined steel shell, with a cap forming the bottom half of the bearing. The pistons are of cast iron, ground to size. They contain five compression rings and two oil-control rings. The hollow steel piston pin is of the floating type, and is prevented from coming in contact with the cylinder walls by two brass cover plates, which are held in place by a threaded tube passing through the piston pins. The cylinder heads are individual castings. Each containing one inlet and one exhaust valve, and two opposed spray nozzles. Flanges on the cylinder

which his analysis was different, but the figures arrived at are the same. These figures are:

Work on lower river prior to 1902	$6,970,510*
Work on projects prior to the present project after 1902	5,482,865
Work done under existing projects prior to June 30, 1933	68,852,733
Total of permanent construction to June 30, 1933	$81,306,108
Plant and material on hand June 30, 1933	2,137,862
Grand total capital cost to June 30, 1933	$83,443,970

* No division of cost in this figure between construction and maintenance. In addition to these figures, a total of $10,603,140 was spent for maintenance in the years prior to 1933.

The annual reports covering the years 1934 and 1935 show actual expenditures, exclusive of value of plant and materials on hand; and show estimates of proposed expenditures for 1936, funds for which were available; together with recommendations for the year ending June 30, 1937. These figures are:

	New work	Maintenance	Total
Reported expenditures, July 1, 1933, to June 30, 1935	$29,843,915	$1,667,663	$31,511,578
Proposed expenditures, year ending June 30, 1936	22,808,467	1,854,895	24,663,362
Recommended expenditures, year ending June 30, 1937	29,000,000	2,920,000	31,920,000
Total work on the river during the present administration	$81,652,382	$6,442,558	$88,094,940
Fort Peck dam—for control of river	110,000,000		110,000,000
Total cost of Missouri river in the Roosevelt administration	$191,652,382		$198,094,940

These totals for the four years omit materials and supplies on hand of more than $2,000,000, so that the grand total is in excess of two hundred million dollars. It is nearly two and one-half times as much as had been spent on the Missouri in all previous history.

This expenditure on the Missouri in four years practically equals the total expenditures on the Ohio river from Pittsburgh to Cairo down to June 30, 1935, which were:

Total cost of locks and dams	$144,913,022
Operation and maintenance of locks and dams	38,130,717
Open channel work on river	22,808,475
Snag removal cost	1,621,122
Total	$207,473,336

Coming down to a comparison with certain projects in the Detroit, Mich., district, this expenditure of $198,094,940 in four years on the Missouri compares with the following projects:

Total gross expenditures to June 30, 1935:	
St. Marys river, canal and Soo locks	$35,701,255
Operation and care of St. Marys Falls canal	7,021,786
St. Clair river, Michigan	2,951,171
Channels in Lake St. Clair	4,782,175
Detroit river, Lake St. Clair to Lake Erie	20,420,308
Maumee river and Toledo harbor, Ohio	6,468,602
Total	$77,345,297

Further comparisons of cost seem needless.

Interest and Maintenance

One thing that is notable in a study of the reports of the army engineers is the apparent fact that interest on prior expenditures does not enter into computations of total cost. Undoubtedly every dollar now being spent for improvements will be represented in the national debt. Interest on the national debt seems to be looked upon as one of the troubles of the treasury, not of the army. The writer cannot get away from the idea that in figuring cost on government work, one must do what our English brothers do, and what every private business is compelled to do, that is give full weight to interest.

A few days ago in looking over the report of a British government commission on a large undertaking that had been proposed, it was noted that the estimate for the work, which would take several years to build was for a total of approximately 47,500,000 pounds sterling, of which 9,615,000 pounds was for interest during construction, an item that may be fully covered in this $110,000,000 estimate on Fort Peck, although nothing in this lump sum figure indicates how much is allowed. Nor do any of the estimates for government work that the writer has seen give enough detail to show whether this important element of actual cost is fully covered.

When the determination is made of the annual cost to the federal government of aiding navigation on the Missouri river, interest must be taken into account.

When Fort Peck dam is finished the government will have an investment in this river of, in round figures, $275,000,000 less depreciation. If the entire cost paid out under all previous projects be assumed to have disappeared, it amounts to less than $12,500,000, leaving $262,500,000 as the capital cost of projects now under way. Assuming an annual allowance of four per cent for interest and depreciation, we have an item of $10,500,000 per year. There are no available estimates as to the maintenance or operating expenses of Fort Peck dam. They will be large, as the plant extends over several miles and a considerable force will be required to operate it.

Maintenance on the river averaged $805,869 per year for the five years ending in 1935. It would appear reasonable to assume that $900,000 to $1,000,000 per year at least will be required for maintenance on the fully completed job, so that a minimum maintenance and fixed charge expenditure will be $11,400,000, or some amount of that order.

What Benefits?

What benefits do we get for this money? Flood protection, navigation and reduction in the amount of bank erosion.

Engineering News-Record, issue of November 29, 1934, discusses the "308 Report" on the Missouri. It appears that most of the lands that are subject to inundation are in the lower valley below St. Joseph, Mo. The article says:

"The district engineer states in his report that because the Fort Peck reservoir lies about 1,500 miles from the lands below St. Joseph, it is difficult to compute the flood benefit to be obtained from the reservoir. However, he estimates that by holding back a flow of 30,000 second feet, it might be possible to reduce flood crests about 1 ft. This lowering would have affected a narrow strip along the edge of the valley, estimated at 81,700 acres in the flood of 1908, and at a less amount in the higher flood of 1903.

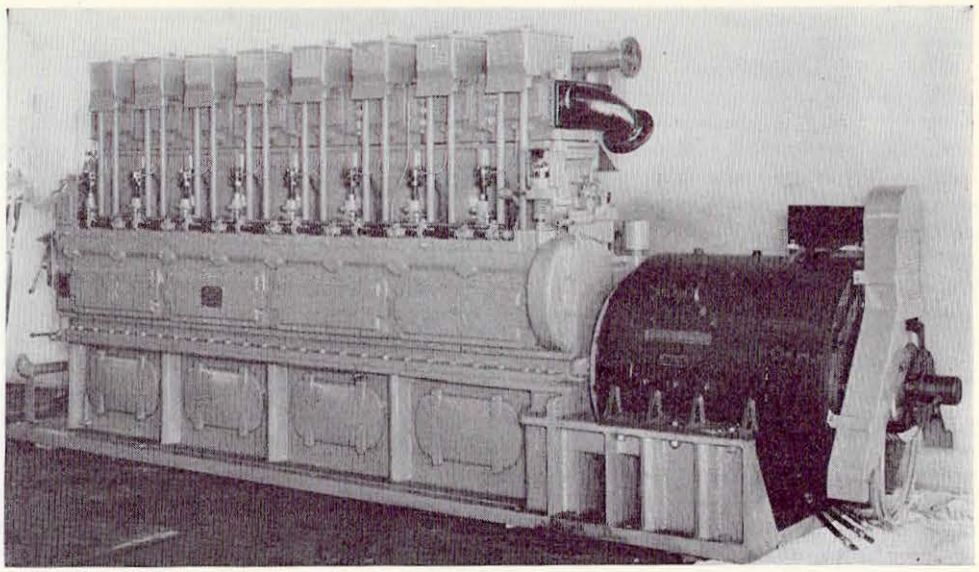
" . . . . This gives an average annual saving of $149,790. Capitalizing this at 5 per cent, it indicates a justifiable expenditure of $2,995,800."

Fort Peck drainage area, a total of 57,725 square miles, is less than 11 per cent of the total drainage area of the Missouri river. It is all in Montana and Yellowstone park. It is generally an arid area with a low rainfall which does not contribute to floods anything like the proportion of water that tributaries of the Missouri south of it do.

Engineering News-Record says, "Consequently if operated for the benefit of Missouri river flood control, would have little if any effect upon Mississippi floods."

Undoubtedly, all of the work done on the Missouri has some beneficial effect on flood control, and the work of building dam and revetments would doubtless be of considerable benefit in the protection against bank erosion. It is very difficult to translate these benefits into money, but so far as the writer has gone into the matter he is not led to believe that more than six or eight million dollars can be justified on this ground.

This leaves navigation as the principal beneficiary. A present value of investment of $262,500,000, and an annual expenditure for maintenance and interest of



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heads bolt together, forming an integral water-jacketed exhaust manifold.

The camshaft carries inlet, exhaust and fuel-pump cams, governor driving gear and over-speed governor. The inlet and exhaust valves are actuated by rocker arms and push rods. The camshaft drive from the crank shaft is by means of an idler gear support on ball bearings. The fuel system consists of a Cameron cam pump motor set, which draws fuel oil from the storage tanks and delivers it under pressure to a filter. Constant fuel pressure is maintained at the filter by a relief valve. From this point fuel oil flows through a header to individual injection pumps, which deliver properly timed and metered quantities of the fuel to the two spray nozzles in each head.

The engines are equipped with a dynamic hydraulic vibration damper, located on the end of the crank shaft away from the generator. The engine governor is driven through bevel gears from the crank shaft, and controls the quantity of fuel delivered to each cylinder. A servo-mechanism is employed to control the governor. The water-cooling system consists of a centrifugal-type pump driven from the crank shaft which delivers water to the jackets of the cylinders and heads. Force-feed lubrication is provided for all wearing parts of the engine. The lubricating-oil supply is stored in the engine sub-base and oil circulation is provided through the medium of a gear-type pump, driven from the crank shaft. Oil drawn from the sub-base passes through a suction strainer, filters, cooling radiators and thence to the engine bearings. The lubricating-oil system is provided with an electric safety switch which stops the engine in the event of failure of the oil supply.

Transmission

The generator is driven through a flexible coupling, the generator being mounted on an extension of the engine sub-base. The generator output varies with engine speed in the conventional way as on any variable-speed engine equipment. At full throttle full engine horsepower is utilized at all speeds from approximately 2 to 15 m.p.h. thus assuring maximum performance of the locomotive within the entire range of switching operation. The excitation is the combined self and separate type.

The traction motor equipment consists of four General Electric type 724 motors which are axle hung, nose suspended units with double reduction drive. In these motors, the high-speed pinion, mounted on the armature shaft, drives a gear on an intermediate shaft which also carries the low speed pinion, the latter meshing with the main gear on the axle. The intermediate shaft is supported in anti-friction bearings in the gear case, which also forms part of the motor-frame structure and is of heavy rigid construction.

There are several reasons for going to a double reduction motor on this equipment. For switching service where the majority of the work is done at speeds of 5 to 8 m.p.h. and maximum speeds rarely exceed 12 to 15 m.p.h. it seemed logical to design a motor the best efficiency of which would occur in this low speed range limiting the maximum speed to about 25 m.p.h. which would take care of transfer work and light movements. The double-reduction motor was the answer. Moreover, the armature becomes a high speed unit and hence comparatively small. The net result is that the GE-724 motor complete with gearing and all accessories weighs 4,500 lb. against 8,100 lb. for motors used previously in similar applications. The smaller motor permits the use of a standard 33-in. tender wheel resulting in a further economy.

The motors are forced ventilated by fans, belt driven from a pulley on the end of the generator shaft, the air being carried through ducts on the underframe and introduced to the motors through a sliding plate connection. The continuous tractive force rating of each motor is 7,000 lb. giving a total rating of 28,000 lb. at approximately 6 m.p.h.

Traction motors are permanently connected two in series on each truck and two motor connections are used series-parallel full field and series-parallel shunted field. It will be noted that there is no transition other than the change from full to reduced field. This means simplified main control connections and snappier performance because there is no lapse in tractive force during the transition period.

The field-shunt circuits serve a double purpose. By the selective operation of the proper field-shunting contactors, weight transfer between axles is compensated for during operation at high adhesion. In other words, the field of the motor on the leading axle of each truck is shunted, thereby reducing the tractive force on that axle approximately in proportion to the amount of weight relieved. This allows all four axles to operate at the same adhesion even though their loads are different, and thereby advantage is taken of the entire weight of the locomotive, and not the weight as limited to about four times the load on the lightest axle under severe weight-transfer conditions. Weight-transfer compensation is obtained by operation of a foot pedal at the engineer's position and is used under much the same conditions as sand. By its use the effective weight of the locomotive is increased about 10 per cent.

As a further aid to rapid switching, slip relays are installed which operate a buzzer at the engineman's position when slipping occurs, giving him instant warning that he has lost the tractive force on one truck or both. This allows a quick recovery and also keeps the engineer in constant touch with track conditions so he can take whatever measures may be necessary to avoid slipping.

Auxiliaries

The main generator also furnishes power for all auxiliaries. At idling speed, 300 r.p.m. with the throttle in the off position, the main generator voltage is regulated at 115 v. by a voltage-control relay. When the throttle is open, the generator continues to operate the compressor and radiator blower, but the battery charge is dropped and the battery furnishes power for control and lights.

The compressor is a high-speed, single-stage, water-cooled machine with a displacement of 100 cu. ft. per min. It is driven by a double-commutator motor for operation at full displacement at 115 v. during idling, and at full displacement at 600 v. when the generator is furnishing traction power.

Provisions were made for heating the locomotives in cold weather from an external steam supply when the Diesel engine is shut down. Keeping the engine from freezing is always a troublesome problem during layovers. The New Haven switchers, therefore, were equipped with a 2-in. insulated steam line with standard hose and coupler head at each end, so that they can be connected either to yard steam supply or to a steam locomotive, and the engine jacket, radiators, piping, etc., kept warm.

The generator is isolated from the engine compartment by a partition, the generator fan discharging on the engine side of this partition. Thus the generator draws cool air in over the control equipment and discharges it into the engine room, putting the engine room under

pressure to assist in its ventilation. The air intake of the engine is taken almost directly at the louvers in the hood doors so as to provide the coolest air possible.

Up to the middle of October three locomotives had been delivered to the railroad and immediately prepared for and put into regular 24-hour service in New Haven. Preliminary plans call for the assignment of three locomotives in New Haven, two in Providence and five in Boston.

Prompt Consideration for Rate Change Proposals

WASHINGTON, D. C.

PROMPT action was taken by the Interstate Commerce Commission on October 23 "to simplify and expedite the proper consideration" of a petition filed by the railroads on October 22 for modification of outstanding orders of the commission in approximately 1,000 listed proceedings and for fourth section relief where necessary to enable them to file tariffs proposing a readjustment in the freight rate structure to take effect upon the expiration of the present emergency charges on December 31.

Pointing out that without the revenue from the emergency charges (which were authorized by the commission in April, 1935, and continued for another six months when they originally expired on June 30, this year), the railroads would have had a large deficit for the first eight months of 1936, the carriers have proposed a large number of changes in base rates which it is estimated would produce some $50,000,000 of added revenue, or about half of that produced during the past year by the emergency charges. Some additional changes are still under consideration. An earlier petition of the railroads asking the commission to enable them to translate the emergency charges into permanent rates had been denied by the commission on August 3.

The new petition named approximately 1,000 cases in which the commission's orders had included the usual provision that they should "continue in force until the further order of the commission" and, without asking the commission to approve the proposed changes in rates, asked that the orders be modified so as to enable them to bring the suggested revision before the commission for its consideration.

Following its receipt the commission issued an order authorizing it to be filed as Ex Parte No. 118 and permitting interested parties to file replies by November 7, announcing that at the close of business on that day the matter would be considered submitted on the petition and such written replies as shall then have been filed, without oral argument. The petition contemplates that the rates when filed shall be subject to protest and suspension. The order provides that any of the parties to the several proceedings under the docket numbers shown in the exhibit attached to the petition, or in any other outstanding and effective order of the commission, and any other persons interested in the subject matter thereof, may file and serve a reply to the petition or any particular portion of it. They may also, if they so indicate their desire, frame such replies so that they may be treated and considered as requests for suspension of tariffs or items thereof which may be filed pursuant to any permission granted upon the petition.

"Your petitioners," the petition said, "are confronted with a situation which demands that they take immediate steps to prevent a substantial decrease in their revenues. For the first eight months of 1936, the net income of Class I railroads was approximately $16,400,000. During the same period the emergency charges authorized by the commission in Emergency Freight Charges, 1935, produced revenue to the Class I railroads of $77,000,000. Without the emergency charges, which will expire December 31, 1936, in the absence of further order by this commission, Class I railroads would have failed to earn by approximately $60,600,000 their fixed charges for the first eight months of 1936.

"Although the volume of traffic during the past year has shown an improvement as compared with the years immediately preceding, it is self-evident that the railroads are not in a position to withstand the loss of revenue which would result from the elimination of the emergency charges in the absence of a revision of base rates. Even with the proposed rates, the railroads will still be in dire need of additional revenues which are to be obtained, if at all, only in the event of a very substantial increase in the present volume of traffic.

"In an effort to bring about a revision of the rate structure to meet present-day conditions and to avoid the enormous decrease in railway revenues which would otherwise follow the expiration of the emergency charges, traffic officials of your petitioners have undertaken an intensive examination and study of the entire rate structure for the purpose of bringing about such reasonable changes in rates as would, in their judgment, after thorough analysis of all attendant circumstances, offset in part the revenue losses which will result from the elimination of the emergency charges. In making this study of the rate structure, your petitioners have had the benefit of actual experience under the emergency charges.

"While the aforesaid study has not been entirely completed, your petitioners are now in a position to propose a large number of changes in the base rates and charges on particular kinds of traffic.

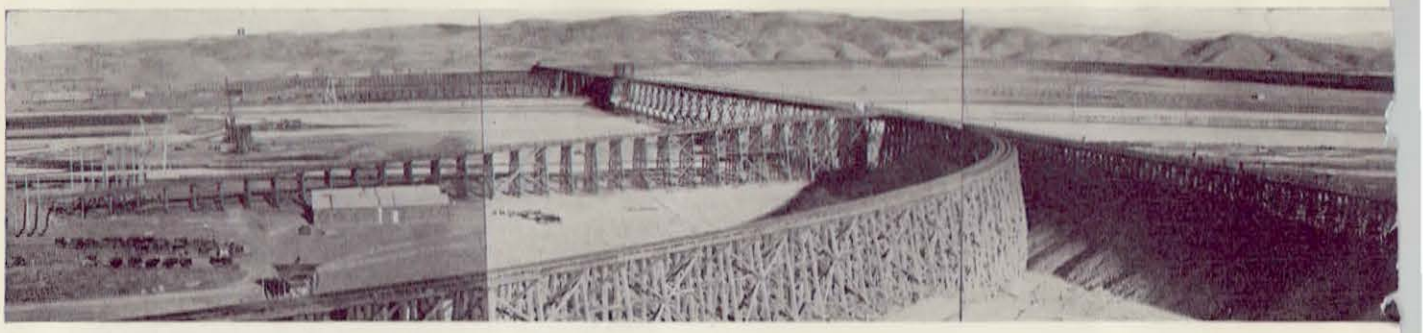
"In some instances the proposed rates involve increases in existing rates, including emergency charges. In some instances, the proposed rates are the same as existing rates, including emergency charges. In many instances, the proposed rates are less than existing rates, including emergency charges, and in some instances less than existing base rates. For example, it is proposed to reduce existing class rates to the level of the present base rates, with the exception of fifth and sixth class rates in official territory which will be somewhat higher than present base rates. Again, with respect to the classification ratings on articles in less than carloads or any-quantity, rated not less than third class in Official, Southern, Western, and Illinois classifications, it is proposed with few exceptions, to make them uniform on the basis of the lowest rating in any one of the classifications. This will result in more than 1,800 reductions in ratings, and less than 40 increases. It will also constitute an important forward step in the simplification of tariffs.

"The proposed changes, in the aggregate, will result in a lower level of rates than the level of existing rates, including emergency charges."

Accompanying the petition were a number of exhibits relating to the financial position of the railroads. One of these exhibits showed that had it not been for the revenues derived from the emergency charges, Class I railroads for the year ended August 31, 1936, would have had a deficit of $17,000,000 in net income.

"A large number of important railroad companies," according to the petition, "which were able to earn their fixed charges during the twelve-month period ending August 31, 1936, would have failed to do so and would

(*Continued on page 641*)



A View of the Fort Peck Dam Site in the Earlier Days of Its Construction, Showing the Magnitude of the Operations

The Fort Peck Dam and Navigation

Is the mammoth investment in this project warranted by the traffic possibilities?

By Henry E. Riggs*

THIS article is written in an attempt to present the facts necessary for a determination of the true economic value of the great construction work now going on at Fort Peck dam in Montana, and the closely allied work of improvement on the Missouri river. The reason, and practically the sole reason, for building Fort Peck dam in Montana is as an aid to navigation. When the dam is finished it will make possible the maintenance of an eight foot depth of water at all times in the Missouri river between Sioux City, Iowa, and its mouth.

There is no provision for a navigation lock at the dam; therefore, it is evident that no vessel traffic is anticipated on the upper river. No power house is being built, although provision is made for the future construction of a power plant if it is ever needed for irrigation pumping or other uses. No present construction of any irrigation works is under way, although obviously irrigation may be a small by-product of the building of the dam.

The dam can be justified therefore only as an aid to navigation. This fact leads directly to a study of what has been done on the Missouri river in the way of improvements to make the stream navigable, and also causes the investigator to determine how much traffic there has been and is on the Missouri to justify any large expenditure. To pass on the economic desirability of Fort Peck dam it is therefore necessary to include the whole subject of the improvement of the river and the extent of the use that is made of the river in water transportation.

The source of information as to river improvement and traffic on the river is found in the annual reports of the chief of engineers of the United States army. The figures presented are analyses made by the writer of a mass of detailed figures as to cost of work, and classified traffic, which have been summarized for convenient presentation.

The Magnitude of the Project

Fort Peck dam is located in northeastern Montana, 1,878 miles above the mouth of the Missouri river, 1,502 miles above Kansas City, and 1,109 miles above Sioux City, Iowa. It is in a semi-arid, sparsely populated territory about 75 miles from the Canadian border, and remote from any large cities, the nearest towns of more than 25,000 population being 150 to 200 miles away.

There have been many articles in the engineering papers descriptive of the dam itself and of the construction methods in use, so that no extended discussion is here necessary or desirable. It will be, when completed, the largest earth dam in the world. It will rise 240 ft. above the bed of the river. At the base, the dam is over half a mile wide. The total length of the dam is a little short of four miles, and the main or high part of it is 9,000 ft. long. It is a hydraulic fill dam, with a steel sheet piling cut-off wall extending to rock over its entire length. Four great electrically-driven dredges with numerous auxiliary pieces of marine equipment have been built on the site and are working on its construction. The dam will create a reservoir 140 miles long, 245,000 acres in area, with a shore line 1,600 miles in length and a storage capacity of 19,500,000 acre feet. The magnitude of this

The Fort Peck Dam and Navigation

The federal government is building one of the world's greatest dams in Montana at a cost of $110,000,000 as an aid to navigation. In addition it is spending, during the present federal administration, as much money on the river as was spent on it from 1844 to June 30, 1933. The facts are presented here upon which to base an opinion as to the necessity, desirability and economic justification of these great expenditures.

* Following several years' service in the engineering departments of the Burlington and Santa Fe railways, and six years as chief engineer of the Ann Arbor railway, the author was for 16 years in consulting engineering practice. He was then professor and head of the department of civil engineering at the University of Michigan for 18 years, from 1912 to 1930, in which latter year he returned to consulting practice. Professor Riggs is a recognized authority on railway valuation and in this capacity has represented numerous railways in valuation and recapture proceedings during the last 40 years.

unprecedented construction can perhaps be best told by the statement that it will require the placing of 105,600,000 cu. yd. of earth, gravel and rock to build it.

It is a truly great piece of construction work, and it is being magnificently done, with the best and most modern of equipment and methods, with a minimum of delays, and the writer believes that many records of unit costs will be broken.

This job has of necessity required from 5,000 to 7,000 men at all times, and it has been so planned as to keep as nearly uniform a force at all times as was possible. From the standpoint of relief of unemployment, its record is fine, and it may be added, there is every evidence that no one is kept on the job who is not a good worker. The charge of boondoggling does not apply at Fort Peck.

This is truly an immense and imposing structure. But what is it for? Are we merely building a great monument to good engineering in the desert? We is the proper word, because every dollar of cost is coming from the national treasury and adding to the national debt.

Some months ago the writer heard one of the engineers give an excellent technical discussion of Fort Peck during which he did not mention the word "dollars." When he had finished, a veteran engineer asked him, "What will this job cost, and what is it good for when done?" The first answer was—"the figure of cost that is given out is $86,000,000. It will cost that and maybe more." On being further questioned as to its real value when completed, the answer was given: "It will give a minimum flow of 30,000 second feet at Yankton, S. D. Whatever 30,000 second feet at Yankton is worth is the value of the dam." Both of these answers were in line with the general policy that seems to be in effect on all public works today, that engineers should stick to details of design and construction and leave the discussion of all other questions to the economists.

What will Fort Peck dam cost? The annual report of the chief of engineers of the army for 1934, on page 842, says: "Total construction cost of the reservoir (estimated) $86,000,000." The annual report for 1935, page 1013, says: "The estimate of cost for new work, revised in 1935, is $110,000,000." This increase of $24,000,000, or 27.9 per cent, is easily accounted for. Under the requirements of an act of Congress passed in 1927, the army engineers made a study of the Missouri river in order to report on the possibilities of flood control, bank erosion protection, navigation and power development. In 1933, that report had not been fully digested and prepared for printing. Fort Peck had been selected as the site for a flood control dam during the course of the survey, and preliminary estimates had been made on two or more different types of structures.

In the autumn of 1933, after PWA had been organized, there was a rush to find desirable projects for federal relief work. The chief of engineers was called upon and on September 30, 1933, he recommended Fort Peck, using a figure apparently slightly above the maximum preliminary estimate which had been prepared for this report. On October 23, less than a month later, work of clearing the site of Fort Peck dam was commenced. The next day, October 24, 1933, the Public Works Administration authorized the work. It did not receive the approval of Congress until two years later, when it was included in the Rivers and Harbors act, passed on August 30, 1935.

Undoubtedly conditions here were similar to those at Bonneville and Grand Coulee, where explorations, surveys, borings, and the completion of working drawings were done after preliminary construction work had started. The 1934 report says that "surveys and borings necessary to the carrying out of the program were made."

The writer is not disposed to find much fault with the increase in cost. A job of such magnitude, with so many things to be done for which there was no precedent, and with a treacherous shale to deal with, calls for the taking of every precaution regardless of expense. If this project was ordered to be built without allowing sufficient time for the preparation of plans, any criticism should be of administrative haste, rather than of insufficiency of estimates, obviously of a reconnaissance or preliminary nature.

We may then accept $110,000,000 as the estimate of cost, subject to such minor changes of plan or contingency as may arise between now and October, 1939, when the job is slated for completion. It is perhaps a good time to call attention to the fact that on January 22, 1884, the report of the secretary of war, transmitted to Congress by the President, gave a total of $111,299,465 as the grand total of *all* money expended for rivers and harbors between March 4, 1789, and June 30, 1882. This included all harbors on the Atlantic, Pacific and Great Lakes, and all interior rivers.

Missouri River Improvements

The policy of the United States government for more than 100 years has been to spend federal funds on navigable rivers, to maintain channels of uniform depth and width, build bank protection, remove snags and in general maintenance of landings and lights on the rivers. The present project on the Missouri is designed to provide a channel 200 ft. wide from the mouth of the river to Sioux City, Iowa, and with Fort Peck dam, to insure a minimum depth of 8 ft. The river is to be held to its course, and bank protection furnished by building permeable dikes and revetments.

Statistical summary No. 17 of the Bureau of Railway Economics shows, on sheet 9, the following figures for the Missouri river, which include capital cost of new work plus value of plant:

Cost of improvements from 1844 to 1906	$9,509,752
Cost of improvements from 1906 to 1933	73,934,218
Total cost 1844 to 1933	$83,443,970

The writer made an entirely independent study in

which his analysis was different, but the figures arrived at are the same. These figures are:

Work on lower river prior to 1902	$6,970,510*
Work on projects prior to the present project after 1902	5,482,865
Work done under existing projects prior to June 30, 1933	68,852,733
Total of permanent construction to June 30, 1933	$81,306,108
Plant and material on hand June 30, 1933	2,137,862
Grand total capital cost to June 30, 1933	$83,443,970

* No division of cost in this figure between construction and maintenance. In addition to these figures, a total of $10,603,140 was spent for maintenance in the years prior to 1933.

The annual reports covering the years 1934 and 1935 show actual expenditures, exclusive of value of plant and materials on hand; and show estimates of proposed expenditures for 1936, funds for which were available; together with recommendations for the year ending June 30, 1937. These figures are:

	New work	Maintenance	Total
Reported expenditures, July 1, 1933, to June 30, 1935	$29,843,915	$1,667,663	$31,511,578
Proposed expenditures, year ending June 30, 1936	22,808,467	1,854,895	24,663,362
Recommended expenditures, year ending June 30, 1937	29,000,000	2,920,000	31,920,000
Total work on the river during the present administration	$81,652,382	$6,442,558	$88,094,940
Fort Peck dam—for control of river	110,000,000		110,000,000
Total cost of Missouri river in the Roosevelt administration	$191,652,382		$198,094,940

These totals for the four years omit materials and supplies on hand of more than $2,000,000, so that the grand total is in excess of two hundred million dollars. It is nearly two and one-half times as much as had been spent on the Missouri in all previous history.

This expenditure on the Missouri in four years practically equals the total expenditures on the Ohio river from Pittsburgh to Cairo down to June 30, 1935, which were:

Total cost of locks and dams	$144,913,022
Operation and maintenance of locks and dams	38,130,717
Open channel work on river	22,808,475
Snag removal cost	1,621,122
Total	$207,473,336

Coming down to a comparison with certain projects in the Detroit, Mich., district, this expenditure of $198,094,940 in four years on the Missouri compares with the following projects:

Total gross expenditures to June 30, 1935:	
St. Marys river, canal and Soo locks	$35,701,255
Operation and care of St. Marys Falls canal	7,021,786
St. Clair river, Michigan	2,951,171
Channels in Lake St. Clair	4,782,175
Detroit river, Lake St. Clair to Lake Erie	20,420,308
Maumee river and Toledo harbor, Ohio	6,468,602
Total	$77,345,297

Further comparisons of cost seem needless.

Interest and Maintenance

One thing that is notable in a study of the reports of the army engineers is the apparent fact that interest on prior expenditures does not enter into computations of total cost. Undoubtedly every dollar now being spent for improvements will be represented in the national debt. Interest on the national debt seems to be looked upon as one of the troubles of the treasury, not of the army. The writer cannot get away from the idea that in figuring cost on government work, one must do what our English brothers do, and what every private business is compelled to do, that is give full weight to interest.

A few days ago in looking over the report of a British government commission on a large undertaking that had been proposed, it was noted that the estimate for the work, which would take several years to build was for a total of approximately 47,500,000 pounds sterling, of which 9,615,000 pounds was for interest during construction, an item that may be fully covered in this $110,000,000 estimate on Fort Peck, although nothing in this lump sum figure indicates how much is allowed. Nor do any of the estimates for government work that the writer has seen give enough detail to show whether this important element of actual cost is fully covered.

When the determination is made of the annual cost to the federal government of aiding navigation on the Missouri river, interest must be taken into account.

When Fort Peck dam is finished the government will have an investment in this river of, in round figures, $275,000,000 less depreciation. If the entire cost paid out under all previous projects be assumed to have disappeared, it amounts to less than $12,500,000, leaving $262,500,000 as the capital cost of projects now under way. Assuming an annual allowance of four per cent for interest and depreciation, we have an item of $10,500,000 per year. There are no available estimates as to the maintenance or operating expenses of Fort Peck dam. They will be large, as the plant extends over several miles and a considerable force will be required to operate it.

Maintenance on the river averaged $805,869 per year for the five years ending in 1935. It would appear reasonable to assume that $900,000 to $1,000,000 per year at least will be required for maintenance on the fully completed job, so that a minimum maintenance and fixed charge expenditure will be $11,400,000, or some amount of that order.

What Benefits?

What benefits do we get for this money? Flood protection, navigation and reduction in the amount of bank erosion.

Engineering News-Record, issue of November 29, 1934, discusses the "308 Report" on the Missouri. It appears that most of the lands that are subject to inundation are in the lower valley below St. Joseph, Mo. The article says:

"The district engineer states in his report that because the Fort Peck reservoir lies about 1,500 miles from the lands below St. Joseph, it is difficult to compute the flood benefit to be obtained from the reservoir. However, he estimates that by holding back a flow of 30,000 second feet, it might be possible to reduce flood crests about 1 ft. This lowering would have affected a narrow strip along the edge of the valley, estimated at 81,700 acres in the flood of 1908, and at a less amount in the higher flood of 1903.

" . . . . This gives an average annual saving of $149,790. Capitalizing this at 5 per cent, it indicates a justifiable expenditure of $2,995,800."

Fort Peck drainage area, a total of 57,725 square miles, is less than 11 per cent of the total drainage area of the Missouri river. It is all in Montana and Yellowstone park. It is generally an arid area with a low rainfall which does not contribute to floods anything like the proportion of water that tributaries of the Missouri south of it do.

Engineering News-Record says, "Consequently if operated for the benefit of Missouri river flood control, would have little if any effect upon Mississippi floods."

Undoubtedly, all of the work done on the Missouri has some beneficial effect on flood control, and the work of building dam and revetments would doubtless be of considerable benefit in the protection against bank erosion. It is very difficult to translate these benefits into money, but so far as the writer has gone into the matter he is not led to believe that more than six or eight million dollars can be justified on this ground.

This leaves navigation as the principal beneficiary. A present value of investment of $262,500,000, and an annual expenditure for maintenance and interest of

$11,400,000 can only be justified by a lot of transportation by water.

The Traffic

The following table summarizes 10 years' traffic on the river, as shown by annual reports of the chief of engineers of the United States army:

Traffic on the Missouri River

Year	Total Tons Moved (1)	Value of Goods Transported (2)	Av. Value Per Ton (3)	Total Ton-Miles (4)	Average Length of Haul Miles (5)
1925	532,620	$1,407,731	2.64		
1926	620,936	1,138,141	1.83		
1927	678,978	1,668,074	2.46		
1928	987,700	2,394,487	2.42	5,901,173	5.98
1929	1,372,400	5,815,408	4.24	9,897,427	7.21
1930	2,215,022	15,027,129	6.79	16,422,404	7.41
1931	1,592,905	5,387,888	3.38	20,135,308	12.64
1932	1,491,575	5,304,516	3.56	50,482,661	34.84
1933	1,334,557	6,211,818	4.65	9,135,023	6.84
1934	1,680,066	9,037,481	5.38	14,600,191	8.69

Columns 3 and 5 are computed.
Ton-miles for 1925, 1926 and 1927 incomplete, therefore omitted.

This table appears to show a gratifying increase in traffic in the later years over that of 1925 to 1927. But, the years of heavy traffic are the years of heavy construction work on the river, and when a study is made of the commodities carried and of the notes in the reports, another story is unfolded.

In the years 1925 to 1929, the detailed report of traffic notes the items "used in river improvement and moved by owners." In 1929, all of the tonnage moved on the river except 6,185 tons, carried this note. The items so marked as used on government work were lumber, piling, trees and brush, coal, sand, stone, cable, hardware, contractors equipment, concrete piling, meat products and vegetable produce.

The sand and gravel supply in this territory is to a very great extent secured from river deposits and it is fair to assume that much, if not most, of it is barged comparatively short distances for construction work in the cities. The total tonnage given in column 1 of the foregoing table has been analyzed as follows in a new table in which:

Column 1 shows the tonnage of piling, brush and stone, in years where all such material is identified as used on government work.

Column 2. Lumber, hardware and contractor's plant. (Most of which is probably used in construction.)

Column 3. Sand and gravel. Short local shipments—little if any used on government work.

Column 4. Coal, some, if not most, of it used on government work.

Column 5. All other commodities.

Column 6. Grand total.

Year	(1) Material for River Imp.	(2) Lumber, Hdw. Contractors Plant	(3) Sand & Gravel	(4) Coal	(5) All other Commodities	(6)	Notes
1925	163,884	.....	348,883	2,963	16,890	532,620	(1)
1926	.....	.....	.....	.....	.....	620,936	(2)
1927	365,285	.....	293,122	7,769	12,802	678,978	(1)
1928	560,664	.....	413,357	.....	13,679	987,700	(1)
1929	1,366,215	.....	.....	.....	6,185	1,372,400	(1)
1930	1,053,006	98,816	803,290	28,079	221,831	2,215,022	(3)
1931	887,949	46,278	521,450	33,484	103,944	1,592,905	(4)
1932	1,068,156	62,762	290,187	49,914	15,556	1,491,575	(4)
1933	946,479	68,177	245,771	49,057	25,073	1,334,557	(4)
1934	1,179,819	122,692	290,736	41,044	45,775	1,680,066	(4)

Notes:
(1) All items in this column are indicated in the report as having been used on government work.
(2) Details not accessible to the writer.
(3) No notes—Classification poor—69,151 tons classified as miscellaneous.
(4) Footnote on report 'A large percentage of traffic reported was used for river work."

This table is clear proof that commercial traffic on the Missouri river is insignificant. Obviously, 90 per cent or more of the total tonnage other than sand and gravel is material which is used in construction work on the river, and which, when construction work is done, will not longer be moved.

Sand and gravel constitute the largest item of commercial tonnage. This is short haul traffic, 3 to 10 miles, from sand banks to the cities for use in construction. It probably would not be affected by a change in the depth of the river from 5 or 6 ft. to 8 or 9 ft.

Comparison with Other Waterways

The insignificant amount and character of the Missouri river traffic and the fact that it does not justify the great expenditures on the river and certainly constitutes no valid reason at this time for building Fort Peck dam, is most clearly brought out by a comparison of total tonnages moved on this and the other rivers that have been referred to. Total tonnage figures for the years 1930, 1932 and 1934 are taken for comparison.

	Missouri River	Ohio River, Pittsburgh to Cairo, Ill.	St. Marys Falls Canal	Detroit River	St. Clair Flats Canal	Maumee River, Ohio
Tons moved, 1930	2,215,022	22,337,434	72,897,752	94,155,189	81,684,168	19,523,122
Value of goods, 1930	$15,027,129	$188,244,870	$760,968,185	$982,987,481	$852,782,714	$81,543,428
Ton miles, 1930	16,422,404	.....	not given	not given	not given	not given
Tons moved, 1932	1,491,575	14,316,914	20,480,873	47,447,128	36,511,005	10,790,210
Value of goods, 1932	$5,304,516	$153,756,626	$354,710,804	$821,784,257	$632,370,607	$45,278,973
Ton miles, 1932	50,482,661	1,392,228,975	not given	not given	not given	not given
Tons moved, 1934	1,680,066	18,636,366	42,248,131	73,717,252	55,454,935	18,325,267
Value of goods, 1934	$9,037,481	$224,444,232	$620,060,128	$1,082,169,259	$814,078,446	$90,400,485
Ton miles, 1934	14,600,191	1,783,924,624	not given	not given	not given	not given

The traffic on the Ohio river in 1934 shows commodities in excess of 100,000 tons as follows:

Coal	10,277,837 tons
Sand and gravel	3,852,972
Petroleum products	1,300,684
Iron and steel—rolled	614,047
Iron and steel—unmanufactured	229,645
Stone	648,809
Cement	107,635
All other	1,604,937
	18,636,366

This table emphasizes the importance of the coal traffic from mines in West Virginia, Kentucky and elsewhere on navigable tributaries of the Ohio.

The cities on the Missouri are essentially railroad towns, while on the Ohio, Pittsburgh, Cincinnati, Louisville and a large number of other large cities and good county seats started as river towns when the Ohio was the main traffic artery of the central United States, and they are still "river minded." The Missouri river never can and never will be a great originator of traffic, such as the Ohio river now is.

Conclusions

It has been shown:

1. That Fort Peck dam, built primarily for the purpose of securing a minimum depth of 8 ft. of water between Sioux City, Iowa, and the mouth of the Missouri, will cost $110,000,000.

2. That there had already been spent on improvement of the river capital costs of $83,443,970, and in addition $10,600,000 for maintenance, when the present administration came into power.

3. That expenditures, actual and estimated, on the

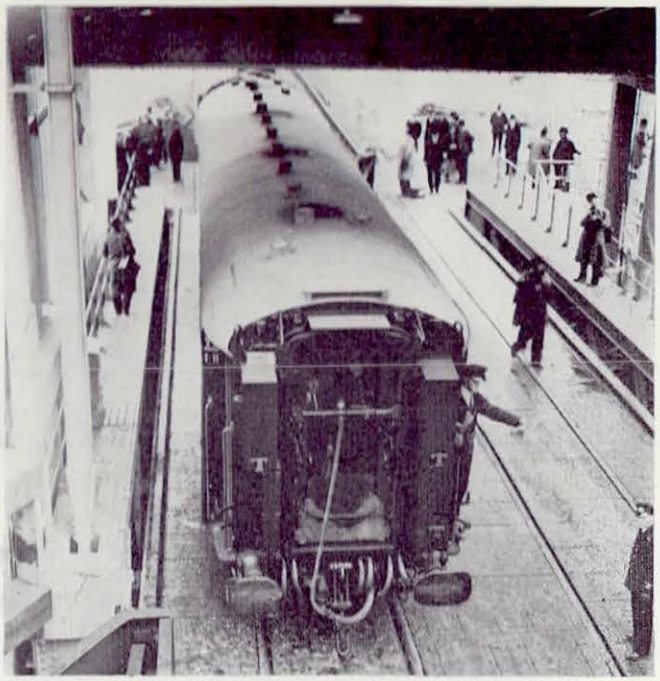
river improvement alone for the four years, June 30, 1933, to 1936, aggregate $81,652,000 for capital costs and $6,442,000 for maintenance, a total of $88,000,000. When the cost of Fort Peck dam is added, the figures for this administration become—invested capital $191,650,000, total expense $198,000,000.

4. That fixed charges and maintenance mean an annual expenditure of at least $11,400,000 per year.

5. That traffic on the year would be insignificant if it were not for the movement of material and supplies needed for government construction work, and, excluding that, commercial traffic is substantially less than 100,000 tons per year.

There are no mines, no factories, no other great sources of originating traffic on the river, so that we are justified in the belief that many years, perhaps many decades, must elapse before any considerable traffic will develop, if it ever does. But fixed charges, maintenance and depreciation never cease to operate.

These are the facts that are needed for basing an opinion as to whether Fort Peck dam, wonderful job that it is, is justified. The writer respectfully submits them with a minimum of argument so that each reader may draw his own conclusions.



Wide World

The First Train Going Aboard the Dover-Dunkerque Ferry

Through London-Paris Sleeping Car Service

THROUGH sleeping-car service between London and Paris was inaugurated on October 14 when the "Hampton Ferry," one of three car ferries built for operation across the English channel, made its initial run between Dover and Dunkerque, thereby linking the rail lines of the Southern of Great Britain with those of the Northern of France. Heretofore travelers have been forced to transfer to boats for the channel crossing.

Wide World

The "Hampton Ferry," One of the Three Boats Built for the New Cross-Channel Service

The three new ferries, built for both passenger and freight service, are each 360 ft. long and 63 ft. wide. They are designed for an average speed of 15 knots and have capacity for 500 passengers. Their tracks will accommodate 12 sleeping cars or 40 freight cars of the small European types, while a garage on the upper deck will house 25 automobiles. The schedules of trains utilizing the new route call for departure from Victoria station, London at 10 p.m. and arrival at Gare du Nord in Paris at 8:55 a.m. In the return direction they leave Paris at 9:50 p.m. and arrive in London at 8:30 a.m.

Many interesting problems were encountered in connection with the establishment of the service, notably those concerned with the construction of suitable dock facilities. Also it was necessary to construct special rolling stock in order to conform to the comparatively restricted English clearances.

The dock problem arose from the extreme variation of the tides. Every possible terminal site on the English side was inspected but it was finally decided to locate the terminal at Dover. Here the extreme variation in tides is 25 ft., and weather conditions are often severe. It was therefore decided to construct an enclosed lock-type dock in which the boat could be berthed while pumps raised or lowered the water level as necessary to effect the transfer of equipment. Docking facilities and a system of locks were already available at Dunkerque, having been constructed there during the war.

The specially-designed sleeping cars were developed by the Compagnie Internationale des Wagons-Lits and are of all-steel construction; they are 62 ft. 11 in. long, 9 ft. ¼ in. wide, the height from the rail level being 12 ft. 9½ in. A special feature of the interior is that each compartment is designed for use either by one first-class or two second-class passengers.

On October 12, two days prior to the start of regular service, a special train carried an inaugural party of railway officers and guests over the route. For space in the new sleeping cars a charge in addition to railway fare of approximately $8 is paid by first-class passengers and one of about $6.30 by second-class travelers.

The Start of the Record Run from Chicago Union Station

Denver Zephyr Breaks World Speed Records

New Burlington train runs from Chicago to Denver, 1,017 miles, at an average speed of 83.3 m.p.h.

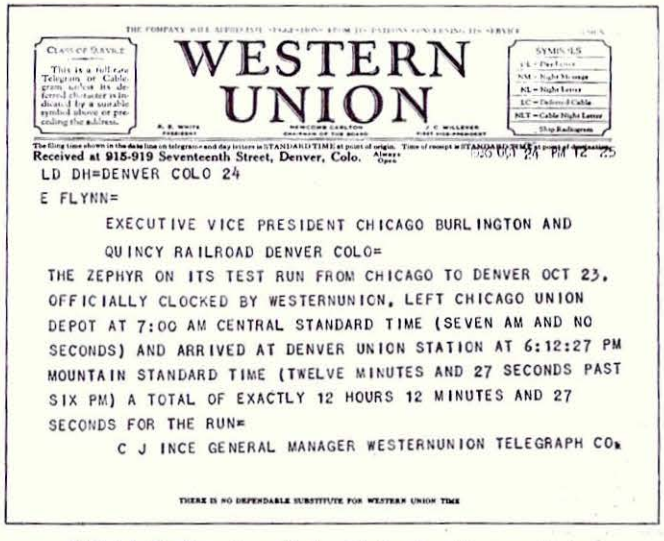
A NEW world's record for railway speeds was established by the Chicago, Burlington & Quincy on October 23, when one of its new Denver Zephyrs covered the 1,017.22 miles from Chicago to Denver in 12 hr. 12 min. 27 sec., an average speed for the entire distance of 83.33 m.p.h. This train, which had come from the builders only a few days before, left the Union station, Chicago, at 7 a.m. (Central Time) and arrived at the Union station in Denver, Colo., at 6:12:27 p.m. (Mountain Time).

On this run, which was made without a stop, a maximum speed of 116 m.p.h. was attained near Brush, Colo., while 26.6 consecutive miles were covered at an average speed of 105.8 m.p.h. in Illinois. The fastest between-station average, 107.30 m.p.h. for 6.11 miles, was made during this stretch. The train traveled from Lincoln, Nebr., to Denver, a distance of 482.66 miles, with a net rise in altitude of 4,035 ft., in 326 min. 32 sec., an average speed for this distance of 88.69 m.p.h.

In addition to the stretch of 26.6 miles at over 100 m.p.h. mentioned above, the Denver Zephyr also operated at speeds above 100 m.p.h. between stations for the distances and speeds shown below:

Miles	Av. m.p.h.
3.14	102.76
15.74	102.75
4.34	104.16
4.69	103.58
6.56	101.36
7.39	100.39
13.73	100.48
11.17	104.18

Since this run bettered the records established by the original Zephyr on May 26, 1934, when it ran from Denver to Chicago in 13 hr. 5 min. (at an average speed of 77.5 m.p.h.), comparisons between the two runs are interesting. The original Zephyr consisted of a power car and two trailer cars, compared with two power cars and six trailers on the Denver Zephyr. Since the route of the original Zephyr was into the Century of Progress exhibition grounds in Chicago, instead of into the Union station there, its mileage was 1,015 miles, or two miles



WESTERN UNION

Received at 918-919 Seventeenth Street, Denver, Colo.

LD DH=DENVER COLO 24

E FLYNN=

EXECUTIVE VICE PRESIDENT CHICAGO BURLINGTON AND QUINCY RAILROAD DENVER COLO=

THE ZEPHYR ON ITS TEST RUN FROM CHICAGO TO DENVER OCT 23, OFFICIALLY CLOCKED BY WESTERNUNION, LEFT CHICAGO UNION DEPOT AT 7:00 AM CENTRAL STANDARD TIME (SEVEN AM AND NO SECONDS) AND ARRIVED AT DENVER UNION STATION AT 6:12:27 PM MOUNTAIN STANDARD TIME (TWELVE MINUTES AND 27 SECONDS PAST SIX PM) A TOTAL OF EXACTLY 12 HOURS 12 MINUTES AND 27 SECONDS FOR THE RUN=

C J INCE GENERAL MANAGER WESTERNUNION TELEGRAPH CO=

THERE IS NO DEPENDABLE SUBSTITUTE FOR WESTERN UNION TIME

Official Confirmation of the Timing by Western Union

less than last week's record run. The following table gives a comparative log of the two record runs:

	Distance Miles	Time: Original Zephyr Min.	Sec.	Av. m.p.h.	Denver Zephyr Min.	Sec.	Av. m.p.h.
Halsted St.-Aurora	35.8	28	18	75.8	30	5	71.4
Aurora-Galesburg	124.4	86	0	86.7	81	25	91.6
Galesburg-Ottumwa	117.4	92	25	76.3	85	25	82.4
Ottumwa-Creston	113.3	91	23	74.4	88	32	76.7
Creston-Pacific Junction	82.1	60	52	80.9	56	48	86.7
Pacific Junction-Lincoln	59.6	58	22	61.2	59	5	60.5
Lincoln-Hastings	96.3	74	47	77.2	71	5	81.3
Hastings-McCook	132.0	97	41	81.1	97	31	81.2
McCook-Akron	142.9	97	45	87.7	94	9	91.1
Akron-Denver	111.4	97	25	68.6	74	47	89.3

As on the original run, the Denver Zephyr operated over the freight cut-off from Pacific Junction, Iowa, to Lincoln, Nebr., thus avoiding the Omaha terminals.

The Passenger List

The trip was sponsored by the Chicago Association of Commerce and was made by a company of "Gentlemen Adventurers" numbering about 125. These consisted of business and professional leaders of the Middle West, newspaper men, and officers of the Burlington and other railways. On their arrival at Denver, a dinner was tendered them by the Chamber of Commerce, after they had been greeted by Governor Johnson of Colorado, and Mayor Stapleton of Denver.

The group returned to Chicago on the new Zephyr, leaving Denver at 7:30 o'clock Saturday night, with six sleeping cars added to the train, on the 15 hr. 50 min. schedule which the coach-accommodation Zephyrs have been making all summer. As a result of various slight mechanical difficulties, this heavy train, with two power cars and twelve trailing cars, was 42 min. late after making a stop just east of Creston, Iowa, for minor repairs, the following morning. However, despite the increased load, the train was then speeded up to cruising speeds of well over 95 m.p.h., reaching as high as 105 m.p.h. at times, and arrived in Chicago only two minutes late, having made up 40 min. on this fast schedule in a 392-mile run. During this run, the Denver Zephyr, with a weight per horsepower of approximately 450 lb., lowered the time of the record run of the original Zephyr, which had a weight per horsepower of 364 lb.

Operating Details

Precautions similar to those taken for the former run were also taken for this one. The schedule and the necessary precautions for safety were worked out at preliminary meetings. The engineering department checked the elevation of all curves. Basic speed charts were available from the previous Zephyr run and the regular schedules this summer, and these were used in determining safe speeds for each portion of this record run. Maintenance officers also rode the cab for the entire distance, calling the proper speeds and giving the operators the benefit of their knowledge of track conditions. For this trip, the crews of each division traversed rode as passengers, the actual running of the train being in the hands of four road foremen of engines thoroughly familiar with the territories traversed.

The municipalities along the way co-operated in protecting the 1,070 public and 619 private crossings, which were roped off and guarded. Many of the towns declared school holidays, so that the children might watch the passage of the train, and crowds similar to the record-breaking ones that watched the original Zephyr were on hand to cheer the Denver Zephyr on.

In addition to checking the track and bridges, maintenance men saw to it that all facing point switches were spiked, and that all water spouts, coal chute aprons and mail cranes were wired down safely. Other railways also co-operated in making the run a success. Arrangements were made with these lines to keep the interlocking plants open for the passage of the Zephyr, and with the government for keeping the Mississippi and Missouri river drawbridges closed for some time prior to the scheduled passage of the train. Signal batteries were checked throughout the entire line, and renewed if they showed signs of exhaustion. As a result of these precautions, the Denver Zephyr encountered only clear signals all the way from Chicago to Denver.

Other Features

While the former record run was down hill practically all the way, the westbound train climbed nearly a mile vertically en route from Chicago to Denver. Leaving Chicago, 588 ft. above sea level, the highest point reached in crossing Illinois is at Kewanee, 853 ft., from which point the line drops down to 532 ft. at the Mississippi river crossing at Burlington, Iowa. There is then a climb and a dip into the valley of the Des Moines river at Ottumwa, followed by a climb into Creston, 1,313 ft., and a drop into the Missouri river valley to 967 ft. at Pacific Junction. From this point there is a steady climb to 2,324 ft. above sea level at Holdredge, Nebr., followed by a drop to 2,074 ft. into the Republican river valley at Oxford, Nebr. From this point, except for a few short dips, the climb is steady into Denver union station, which is 5,183 ft. above sea level, or 4,589 ft. above Chicago. Between Chicago and Denver, there were 13 slow-orders limiting maximum speeds to 50 m.p.h. or less for the Zephyr, mostly owing to curves. The slowest of these was at Pacific Junction, a 20 m.p.h. order. There were two others of 25 m.p.h. for turn-outs, and one of 25 m.p.h. over a 12 deg. curve at the west end of the Missouri river bridge, near Plattsmouth, on the Ashland cut-off.

The run was timed electrically by Western Union, the train breaking ribbons attached to clocks at the start in the Chicago Union station, at Halsted street, where the original run ended, and at the finish of the run at Denver Union station.

The Denver Zephyr that made this run will be used for exhibition purposes until November 7 when, with a duplicate train, it will be placed in daily overnight 16-hr. service between Chicago and Denver.

* * *

The Canadian National's Streamlined 4-8-4 at Ste. Annes, Que.

Investigation of Freight Forwarding

Additional evidence presented at New York hearing which closed on October 23—Re-opens at Chicago November 30

NEW YORK hearings in connection with the Interstate Commerce Commission's investigation of freight forwarding closed on October 23 after a series of sessions extending over two weeks. The hearings, which are being held before Examiners R. N. Trezise and C. A. Rice, with I.C.C. Attorney William J. Walsh directing the presentation of evidence, will be reopened at the Morrison Hotel, Chicago, on November 30.

Proceedings at New York, in addition to those reported in the two preceding issues of *Railway Age*, included presentations of evidence gathered by I.C.C. field representatives in connection with the Lehigh Valley, the Pennsylvania, the Baltimore & Ohio, the Reading and the Southern. Also there were introduced exhibits and testimony bearing upon the Railway Express Agency's difficulties in competition with forwarders.

Lehigh Valley

Testifying with respect to his investigations on the Lehigh Valley, E. J. Powers, special agent of the I.C.C. Bureau of Inquiry, said that the principal forwarder operating over that road is the Universal Carloading & Distributing Company. Among others are the Kelleher Carloading & Distributing Company and the Acme Fast Freight, Inc. The Universal in 1935 routed 15,803 cars over the Lehigh, as compared with 14,312 in 1934.

Like the other roads, the Lehigh loads carload freight at New York and, under the promiscuous loading rule, batteries of cars are set up for Universal's traffic according to the forwarder's daily layout. In connection with the dispatch of these cars Mr. Powers described what is called the "hold" and "go" practice under which cars billed as one shipment moved out of Jersey City on different days. In other words cars marked "hold" were permitted to move out of Jersey City—this Mr. Powers called the "go" part of the plan; and such cars were not billed until their aggregate tonnage reached the carload minimum—the "hold" part of the plan. He cited as an example a shipment in June, 1934, of three cars from New York to Memphis, Tenn. One car containing 14,125 lb. of freight, moved on June 9, on a memorandum waybill; the second, containing 9,337 lb., moved on June 12; and the third, containing 14,291 lb., moved on June 14. Shipping orders for these movements, billed as a single shipment, were rendered to the Lehigh on June 14 and the revenue billing on June 15.

The foregoing practice, Mr. Powers said, was discontinued generally in August, 1934, although it was continued with respect to Minneapolis, Minn., freight until 1935, and was still being applied to Wilkes-Barre, Pa., cars this year. Meanwhile cars of the Kelleher Carloading & Distributing Company marked "hold" were actually held at Jersey City.

Mr. Powers next referred to Universal's practice of invoking the stop-off rule to stop cars at Newark, N. J., for completion of loading. In this connection he said empty cars are placed originally at Newark and at the end of the day the Universal representatives at Newark and New York confer by telephone to decide upon the billing. If there is sufficient freight at Newark to make the carload minimum the Newark car is handled as a shipment from that point; if not it is treated as a stop-off car from New York. The Lehigh, the witness said, justifies this practice on the grounds of operating convenience, but he added that the carrier doesn't know when placing them whether the cars loaded at Newark are to be billed as Newark cars or as stop-off cars.

The Acme's operations on the Lehigh are principally between New York and Rochester and in this connection Mr. Powers found an instance where a refrigerator car was being loaded with freight moving under the all-commodities tariff. He also presented an exhibit which he said contained correspondence indicating that Lehigh traffic officers were "giving pointers and traffic tips" to Universal solicitors.

Questioned by E. H. Burgess, general solicitor of the Lehigh Valley, the witness agreed that from an operating point of view it was perhaps advantageous to let the "hold" cars move out of Jersey City as they were received there, but he insisted that such practice created a situation wherein charges were assessed on a carload basis on what would ordinarily be a group of l.c.l. shipments. Also Mr. Powers "wouldn't criticize" from an operating viewpoint the placing originally at Newark of stop-off cars, but here again he called attention to the fact that he found no tariff authority for such practice.

A. C. McIntyre, freight traffic manager of the Lehigh Valley, was the next witness. He was questioned first with respect to diversions of eastbound Universal traffic from his road to the New York Central and stated that approximately 400 cars a month were thus lost to the Lehigh. He understood, however, that his road had received additional westbound Universal business out of Philadelphia. Then Mr. Walsh referred to a letter from one of the exhibits which the I.C.C. attorney said carried a suggestion that the Lehigh might reward the New York Central for this additional business of Universal out of Philadelphia by giving the N. Y. C. more of the Lehigh's company fuel traffic. The witness could not, however, say that anything was given in return for this Philadelphia business, and he later told Mr. Burgess that if there were any such trade he would know about it.

Lehigh "Strong" for Forwarder

The Lehigh, Mr. McIntyre said, is "very strongly of the opinion" that the forwarder provides the best method for handling l.c.l. traffic. He thinks the consolidating companies have become specialists in that line and that the resultant net to the Lehigh is a good return. The most important reason why the railroads cannot perform the same service themselves, the witness next told Mr. Walsh, is due to a carrier's inability to assume also the role of a shipper. Furthermore, Mr. McIntyre continued, the forwarder in effect serves "practically all points" on the Lehigh by reason of the former's utilization of both rail and truck service. The forwarder has recovered much business for railroads, the witness next observed, but agreed also with Mr. Walsh that the forwarder was also responsible for putting freight on the highway. The latter, Mr. McIntyre thinks, has oc-

curred only where railroads have failed to effect a proper set-up for the forwarder's operations.

Asked his opinion regarding regulation of forwarders the witness said that he had always considered the forwarder as a shipper, adding that "as a shipper I think he is regulated." He was not familiar with the forwarder's relationship with individual shippers but thought that "as a general proposition" he would favor regulation of such relationships. Mr. McIntyre next agreed with J. R. Turney, counsel for Acme, that it would be impossible for a railroad to give a nation-wide service comparable with that of forwarders without materially restricting its routes.

Examiner Trezise here expressed a desire to obtain the witness' opinion as to "what is this mysterious view, if it be one" that the railroads can't operate a forwarding company; whether "the railroad is rail-minded and the forwarder truck-minded and never the twain shall meet;" or whether investments in forwarders are now so placed that it would be inexpedient to attempt to dislodge them. Mr. McIntyre was unfamiliar with the financial angle, but he saw no reason why railroads could not get into the forwarding business if they desired. He thinks, however, that they would be no better off from a revenue standpoint than they now are. One stumbling block, he continued, would be the situation at interchange points—the forwarder can now hold to one line whereas the individual railroad in the consolidating business would be solicited intensively by all connections.

Undesirable Practices "Seem to Be Creeping Out"

Asked by the examiner if he had been impressed at the hearings with the idea that the railroads have been "a little over-enthusiastic" in their efforts to obtain and hold forwarder business, the witness stated it to be his experience that all railroads, "especially our competitors," are always enthusiastic about getting any carload business. When intensive competition is present, Mr. McIntyre continued, several undesirable practices creep in; the railroads, he added, try to police such situations but any inquiry would turn up something. The examiner next observed that these practices "seem to be creeping out since this investigation started." Thus, he continued, if the probe does nothing else it "has had a salutory effect." The witness agreed.

Next followed a discussion of the forwarder's advantage resulting from his lack of necessity to observe shippers' routings; and Examiner Trezise asked, if the right of l.c.l. shippers to route freight couldn't be taken from them. Mr. McIntyre thought this right was an important one although he agreed with Mr. Walsh's suggestion that it is waived by shippers using the forwarder. In this connection Mr. Turney observed, and the witness agreed, that the shipper's right to route is exercised in his choice of a forwarder. When Mr. Walsh asked why a railroad-owned organization similar to the Railway Express Agency could not be set up to take over the consolidating operations on all railroads Mr. McIntyre replied that "If the result to the Lehigh Valley is going to be anything like it is with the Express Agency, we don't want it."

Turning to the all-commodities rates under which the great bulk of forwarder traffic moves, Examiner Trezise asked if these rates are yet down near a non-compensatory level. Mr. McIntyre replied that in his opinion "any time you can get carload traffic at a rate fifth class or higher you are getting a good return."

Pennsylvania

Evidence gathered by I.C.C. investigators with respect to the Pennsylvania was next presented, while officers of the P.R.R. who have been subpoenaed will appear at the Chicago hearings. In the former connection I.C.C. Attorney G. W. Rouse, who is assisting Mr. Walsh, offered the testimony of Mr. Powers who stated at the outset that the Pennsylvania now has no financial interest in any forwarder. Prior to April, 1933, the Pennroad Corporation controlled National Freight Company which was merged into National Carloading Corporation, the Van Sweringen affiliate. The principal forwarder operations on the P.R.R. are those of the National and Acme, the latter having increased materially during the past year.

Next I.C.C. Attorney Rouse was put on the stand by Mr. Walsh to testify regarding an exhibit introduced by Mr. Walsh of correspondence taken from the files of the Railway Express Agency. This correspondence consisted in part of letters between departments of the Express Agency and in part of letters from and to officers of various railroads. Mr. Rouse got no further in his testimony than a statement that the exhibit, and conversations he had had with Express Agency officers, revealed a considerable loss of traffic to forwarders, when Mr. Turney objected. The Acme counsel contended that hearsay testimony could not be presented from the Express Agency, since it is not a party to the proceeding and he did not want testimony from witnesses whom he could not cross examine.

Examiner Trezise ruled that only that part of the exhibit could be received in evidence which consisted of letters from railroad officers, parties to the proceeding. Mr. Walsh stated that this ruling "emasculated" his exhibit and hence he withdrew his witness and the exhibit for the time being.

Mr. Walsh next called upon George S. Lee, who retired on October 1 as traffic vice-president of the Railway Express Agency. Mr. Lee testified that a substantial part of the traffic now handled by forwarders was formerly handled by the Express Agency and could be so handled now. Express business began to decline in 1930, he said, but it was difficult to determine how much of the loss was ascribable to the depression and how much by reason of diversion to competitors. The trucks got some of it; the forwarders some; and the parcels post some.

Railroads Forestall Express Rate Reduction

He related how the Express Agency in 1932 had attempted to regain some business lost to forwarders by establishing a "destination aggregate rule," enabling a consignee to pay rates based on total shipments received from a multiplicity of shippers; but the Interstate Commerce Commission would no permit this. Then, he said, the Agency tried to reduce transcontinental rates on "department store business" moving from the garment center in New York to Pacific Coast points. (Twenty-two per cent of the Agency's business originates in New York, and much of it comes from the garment center; and here forwarder competition has been chiefly felt.) The Agency's rate to San Francisco is $12.80 per 100 lb. It wished to reduce the rate to $10, believing sufficient business would be retrieved to offset the loss and that further diversion would be stopped. But this effort was defeated by the opposition of the railroads, which control the policy of the Express Agency in rate matters—and the opposition came largely from those roads which enjoy a large forwarder business in this class of traffic.

Among the reasons advanced by the railroads for vetoing this reduction, he said, was the danger of breaking down the rate structure—but he was "not impressed" by this argument. He said he was told by some railroads that they made more money when the business

was moved by a forwarder than when the Express Agency handled it and hence favored the former.

Turney Denounces Freight-in-Baggage-Car Restriction

In answer to a question, Mr. Lee said that the uniform contract between the Agency and the railroads prevented the latter from transporting freight on passenger trains, whereupon Mr. Turney objected that this clause was not binding, as being contrary to public policy. Mr. Lee said that the Agency had heard of violations of this clause and had protested to the railroads involved. "Department store business" had also been lost between New York and Washington, he admitted—particularly to Acme—which gave overnight service at a rate not much more than half that charged by the Express Agency. Reductions to meet this competition had not been made, he said, because of Fourth Section complications which would result.

Asked whether there had been any discussion of the Express Agency going into the forwarding business, Mr. Lee said that there had been, particularly immediately following the publication of the co-ordinator's traffic report. He said that the Agency could handle a considerable increase in business without a proportionate increase in expenses, pointing out that it turned over to the railroads 38 per cent of its gross revenues in 1935, whereas from 1924 to 1926 payments to the railroads averaged 50 per cent of gross revenues. Mr. Turney, in cross-examination, attempted without success to get the witness to admit that the Express Agency was a less efficient organization for handling package freight than the freight forwarders.

Freight in Baggage Cars on B. & O.

Mr. Rouse followed Mr. Lee to testify in explanation of several exhibits of correspondence which he had collected from the traffic department files of the Baltimore & Ohio. At the time covered by his investigation, the Universal was moving freight over the Baltimore & Ohio between New York, Philadelphia, Baltimore and Washington to Pittsburgh and out of Pittsburgh to Cincinnati, Indianapolis, Louisville and St. Louis. Universal freight and the railroad's own l.c.l. was being moved out of New York in baggage cars on passenger trains to Philadelphia where a freight train made up entirely of baggage cars handling l.c.l. and forwarder business was dispatched over night to Pittsburgh. There was a similar movement eastbound out of Pittsburgh serving Seaboard metropolitan centers. The correspondence, he testified, showed that the Baltimore & Ohio had provided this service when confronted with the prospect of losing the Universal business unless it did so. There was, he said, a disinclination on the part of the railroad to handle carload traffic of other shippers in this train.

O. S. Lewis, general freight traffic manager of the Baltimore & Ohio, testified that all of the Universal traffic had been diverted from the Baltimore & Ohio except that moving from New York and Baltimore to Pittsburgh and that notice had been served that this would be taken away on November 15. The railroad, he said, had encouraged this forwarder by giving it "service to compete with trucks, with other railroads and with forwarders using other railroads." As a part of this encouragement it had leased space to the forwarder in its stations and had built or remodeled station facilities for forwarder use and had put in mixed merchandise rates between a number of points. The Pittsburgh facility, he stated, which had been built for the use of Universal in 1930, cost $207,000 (warehouse, platforms, and drainage). With the value of the land included, the value was given at $471,000. Universal paid an annual rental of $7,800. Mr. Lewis explained that this figure was set when the total cost was expected to be only $125,000. It was developed that taxes on the installation totaled some $6,600 and Mr. Lewis testified "that the taxes were something which was practically overlooked" when the rental price was fixed.

Since September 27, Mr. Lewis stated, l.c.l. and forwarder business for Pittsburgh has been handled out of New York in baggage cars on freight trains and not on passenger trains as formerly. This train is now handling cars of the General Carloading Company as well as those of the Universal. It was developed that the railroad has some indirect interest in this last named forwarder which was acquired after Universal had indicated its intention to divert its traffic away from the Baltimore & Ohio. Asked what the railroad would do if other shippers of carload freight had demanded this fast service, the witness replied that if they were shippers of mixed merchandise he thinks their demands would have been acceded to.

How Railroads Can Meet Truck Competition

Mr. Lewis explained that the Baltimore & Ohio had always felt, if there were any profit to be gained from l.c.l. service, that there ought to be a way by which it would accrue to the railroad, but that so far no practical method had been found to bring this about. Trucks, he said, have taken away a large volume of traffic for four reasons as follows:

1. Quicker service
2. Lower rates
3. Collection and delivery
4. Less rigid packing requirements.

To meet this competition, he continued, the railroad must offer all four of these advantages but heretofore, for the most part, they have tried offering them only one at a time. Collection and delivery alone had been tried; fast service also. No reduction in l.c.l. rates, however, had been made because of the affect which it might have on the general rate structure. The forwarder, not being regulated, could more nearly offer all the advantages of truck service than the railroads could. Hence, to the extent that the forwarder could compete with trucks and put business on the rails, it had been of great value to the railroads.

But the Baltimore & Ohio still thinks, he continued, that there should be some method worked out whereby the business could be offered by the railroads without any intermediary. Asked whether he had developed such a method, he answered, "I am not ready to spring it." Asked why his road had suffered a general diversion of forwarder traffic, he summed up his answer in one word, "Keeshin." He explained, however, that the method of getting all merchandise traffic revenue for the railroad was not the arrangement with the Keeshin Company but instead referred to "something else we are incubating."

The witness explained that the Keeshin Company is a general trucking organization operating exclusively over the highway. The Baltimore & Ohio felt that by making joint rates with this company it could act as a bridge between the trucker's terminal operations and get more highway business back on the rails, and revenue which would exceed the out-of-pocket costs. The company has not gone forward with this, however, because of the desire of the trucker to establish the legality of the service in connection with its operation over the Chicago Great Western between Chicago and the Twin Cities before it extends the service elsewhere.

Asked about his views as to the effectiveness of rail-

road collection and delivery service in supplanting the forwarder, he replied that the Baltimore & Ohio was hopeful that it would succeed in this direction to some extent, "but we were not very sanguine." He was of the opinion, however, that if the railroads offered collection and delivery and were given a free hand with respect to rates to meet competition that the forwarder would not be necessary. He believed that all forms of transportation should be regulated to the same extent and, furthermore, that "the rate the shipper pays should be the same regardless of the form of transportation used."

Why L.c.l. Operations Appear Less Lucrative Than Forwarder Traffic

Mr. Turney cited some figures from an exhibit showing that the Baltimore & Ohio received some 7.44 cents in revenue per car-mile from its own l.c.l. service, after payment of out-of-pocket terminal costs but before payment of line-haul costs, whereas revenue per car-mile in one of its forwarder operations was 23 cents. He then asked the witness if this did not show that the handling by a forwarder represented an advantage to the railroad. The witness, however, pointed out that the railroads had to maintain l.c.l. service everywhere even when much of the business had been diverted to handling by forwarders and that overhead costs were charged against a smaller volume of freight, which reduced the net revenues of l.c.l. freight remaining to the railroad. The witness expressed the belief that a plan would be worked out which would enable the railroad to handle this class of business profitably without the intervention of a forwarder.

Following Mr. Lewis, Mr. Walsh called Special Agent Powers who placed in evidence correspondence taken from the files of the Reading, showing the transactions between that company and several forwarders. Most of this business centered in Philadelphia. At one station in Philadelphia, where most of the forwarder business was that of the Universal for the Baltimore & Ohio, no rent was charged the forwarder for the use of platform space—and loading and unloading (being a tariff obligation on the railroad at this and several other stations in Philadelphia) was performed by the forwarder's forces with an allowance of 39 cents per ton from the railroad. Platform space in other stations was used by forwarders rent-free, but they paid for office space in one or two instances. The witness testified also that there was delay in rendering freight bills to the forwarders and that such bills were not always promptly paid during the 96 hours allowed for this purpose. He also testified that all-commodities cars routed to Pittsburgh via Shippensburg was actually handled via the B. & O. at Park Junction, by which latter route there was no all-commodities rate and hence that considerable undercharges by the forwarder had accrued.

The next witness, E. D. Hilleary, vice-president in charge of traffic of the Reading, testified that all such undercharges, as far as the Reading was concerned, had been settled. Questioned as to the provision of free platform space to a forwarder who used a portion of that space for handling shipments which did not move via the Reading, but rather by another railroad and by trucks, Mr. Hilleary admitted that this had occurred, but that the condition no longer existed. He said that the Reading had fostered operations, believing them to be of great help to the railroads in meeting truck competition. He added that the Reading had no stock in any such companies and that he favors "reasonable" regulation of such operations.

At the close of the hearing, Examiner Powers placed in evidence ten exhibits of correspondence taken from the files of the Southern Railway, and was followed by George Griffiths, general traffic manager of Sterling Products, Inc., who made a presentation against multi-carload rates as being discriminatory to shippers not in a position to use them.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading continued to increase in the week ended October 17, reaching a new record for the year with a total of 826,155 cars, a gain of 5,960 cars as compared with the loading for the previous week and of 93,851 cars, or 12.8 per cent, as compared with that for the corresponding week of last year. Grain and grain products and live stock showed decreases as compared with last year's figures but all other commodity classifications showed increases. Miscellaneous loading was 46,688 cars greater than that reported for last year. Merchandise and ore showed decreases as compared with the preceding week. The summary, as compiled by the Car Service Division of the Association of American Railroads, follows:

Revenue Freight Car Loading

For Week Ending Saturday, October 17

Districts	1936	1935	1934
Eastern	161,374	151,224	136,939
Allegheny	160,445	133,420	117,050
Pocahontas	58,596	53,125	43,845
Southern	111,298	99,731	88,828
Northwestern	135,575	114,710	90,352
Central Western	132,540	119,131	109,069
Southwestern	66,327	60,963	54,644
Total Western Districts	334,442	294,804	254,065
Total All Roads	826,155	732,304	640,727
Commodities			
Grain and Grain Products	32,582	36,118	31,292
Live Stock	22,612	22,970	27,392
Coal	157,144	138,294	125,975
Coke	10,582	7,427	5,838
Forest Products	36,033	31,376	23,345
Ore	55,281	33,602	16,685
Merchandise L.C.L.	168,999	166,283	163,400
Miscellaneous	342,922	296,234	246,800
October 17	826,155	732,304	640,727
October 10	820,195	734,154	636,999
October 3	819,126	705,974	632,406
September 26	807,070	629,935	646,084
September 19	789,510	706,820	644,498
Cumulative Total, 42 Weeks	28,644,068	25,284,516	25,272,584

Car Loading in Canada

Car loadings in Canada for the week ended October 17 declined from a total of 60,219 for the previous week to 55,182, the decrease being due largely to the holiday on October 12. Compared with loadings for the forty-second week last year, which did not contain a holiday, the decrease was 1,103 cars, according to the compilation of the Dominion Bureau of Statistics.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada:		
October 17, 1936	55,182	24,492
October 10, 1936	60,219	25,497
October 3, 1936	60,278	24,231
October 19, 1935	56,285	22,736
Cumulative Totals for Canada:		
October 17, 1936	1,964,701	966,911
October 19, 1935	1,889,968	891,522
October 20, 1934	1,860,693	906,255

Reports and papers presented at forty-third annual meeting related to pertinent problems and were actively discussed

The Ohio River Bridge of the Southern at Cincinnati

Bridge and Building Men Convene at Chicago

Part I

WITH a program embracing eight committee reports and three papers, dealing with problems arising in the maintenance of railway structures, the American Railway Bridge and Building Association conducted a busy and profitable convention at the Hotel Stevens, Chicago, on October 20-22. At a luncheon on Wednesday, C. E. Johnston, president of the Kansas City Southern, delivered an address on Loyalty and Leadership. Following the adjournment of the convention on Thursday noon, the afternoon was occupied by an inspection of the plant of the Johns-Manville Corporation at Asbestos (Waukegan), Ill.

The convention was opened with greetings from the American Railway Engineering Association and the Roadmasters and Maintenance of Way Association, the former represented by its president, A. R. Wilson, engineer of bridges and buildings, Eastern Region, Pennsylvania, Philadelphia, Pa., and the latter by its second vice-president, A. H. Peterson, roadmaster, Chicago Milwaukee, St. Paul & Pacific, Chicago. In his presidential address to the association at the opening session, T. H. Strate, division engineer, Chicago, Milwaukee, St. Paul & Pacific, Chicago, reviewed the affairs of the association during the last year and pointed to the marked improvements in operating economies that have been made by the railroads in recent years. He cited the increase of 44 per cent in tractive power of the average steam locomotive during the last 15 years, the increase of more than 27 per cent in the running speed of freight locomotives and the decrease of 22 per cent in fuel consumed per 1,000 gross ton miles, as evidences of the efficiency with which the railways are being operated today. Mr. Strate also referred to the recent development of the A.A.R. standard steel box car and the air-conditioning of more than 7,000 passenger cars as evidences of the progressive trend in railway mechanical design. "Civilization has always advanced," he said, "where men have been free to dream, to plan and then to carry their plans to fruition. This is likewise true of the railways. To set them free at this time would give an impulse to business and industry of the country which would be felt in every section of the land."

That the program of the convention had been drafted with a view to a thorough discussion of problems of current interest to the members of the association is indicated by the subjects of the various committee reports and papers that were presented for consideration and discussion. Thus, the committee reports covered the Protection of Steel Bridges Against Brine Drippings, the Relative Merits of Different Species of Wood for Timber Bridges, Recent Developments in Preframing Timber Bridges, the Maintenance of Railway Roofs, the Inspection and Maintenance of Water Tanks, Adapting Bridge Maintenance Methods to Today's Requirements for High-Speed Trains, Rebuilding the Bridge and Building Organization to Meet the Demands of the Recovery Period, and Underwater Repairs to Piers and Abutments. Harry R. Duncan, superintendent of timber preservation, Chicago, Burlington & Quincy, Galesburg, Ill., presented a paper, illustrated by motion pictures, on Termites in Railway Structures. Another paper was presented by F. L. Browne, senior chemist, Forest Products Laboratory, Madison, Wis., on Recent Developments in Paint for Building and Structural Uses, while R. P. Hart, assistant bridge engineer, Missouri Pacific, St. Louis, Mo., read a paper on Meeting Specific Problems in Bridge Design.

In the election of officers First Vice-President E. C. Neville (bridge and building master, C. N. R., Toronto, Ont.) was advanced to the presidency, while C. Miles Burpee (research engineer, D. & H., Albany, N. Y.); F. H. Masters (assistant chief engineer, E. J. & E., Joliet, Ill.); and C. A. J. Richards (master carpenter, Penna., Chicago), second, third and fourth vice-presidents, respectively, were each advanced one grade, and W. S. Lacher, engineering editor, *Railway Age*, was

elected fourth vice-president. C. A. Lichty was re-elected secretary-treasurer, while B. R. Meyers, assistant general bridge inspector, C. & N. W., Chicago; George S. Crites, division engineer, B. & O., Punxsutawney, Pa., and R. E. Dove, assistant engineer, C. M. St. P. & P., Chicago, were elected directors to serve two years. Chicago was selected as the convention city for 1937.

Abstracts of some of the papers and addresses are presented below, others will be published in the next issue.

Loyalty and Leadership

By C. E. Johnston*

I wonder if you share my view that there is a real danger today that efficiency may be somewhat on the wane because loyalty is on the wane and that one of the principal causes of this condition is the fact that there is a tendency on the part of those in responsible charge to overlook the importance of providing means and methods for instilling, cultivating and rewarding loyalty among our supervisory and working forces.

In my judgment, the officers and employees of the bridge and building department are not excelled by those in any other department in loyalty and efficiency. The question is whether we are to maintain that high honor. There has been a remarkable improvement in the methods employed in performing work but this has largely come about through advancement in machine operation. I doubt sometimes that equal progress has been made in handling the human element.

Destructive propaganda is the order of the day and workers are subjected to new and dangerous influences. It is true that the disturbing element has always been with us but in earlier days the grievances usually arose with the men themselves concerning wages and working conditions. Amicable adjustment having been made, they could be relied upon to perform satisfactorily.

Today the paid agitator keeps the pot boiling constantly. Strained and unreasonable interpretations of existing rules are advocated actively; minor grievances are magnified and enlarged upon and new fires are constantly breaking out in other places. It is up to us, as leaders, to devise ways and means of overcoming these dangerous doctrines so that the employees may be completely and honestly informed of the facts. This is the call that must be answered and if results are to be obtained, it will be through the thought and purpose of those supervisors who are in a position to inspire confidence. Putting it plainly, the solution is embodied principally in one word—leadership.

I am firmly of the opinion that diminished loyalty can be traced directly to lack of leadership, and by "leadership" I mean constructive thinking along the lines of improved selection and training of men; improved human relations; improved ways and means of affording opportunities to those deserving recognition; improved education along constructive lines; improved methods of combating subversive propaganda; in short, improved supervision from top to bottom.

Either before or after a man enters the service, do we provide any means by which he may have the advantages of systematic training along the lines of the work he is to do? Do we leave it entirely up to the foreman to select his men and expect him, without assistance, to guide their thoughts into constructive channels and their talents and abilities into efficient usefulness? Do we provide any checkup to prevent inefficient and undesirable floaters from drifting from place to place in our service, thus burdening the payrolls with their presence beyond the period in which their unfitness was first determined? Do we afford any means for combating the destructive propaganda that is constantly being directed at our loyal forces? Do we keep sufficiently in touch with the personal problems of our men, their joys and sorrows, their need for friendly assistance when other avenues are closed, their ambitions, hopes and aims in life?

To many of you these items may appear to be far-fetched, but to me they represent questions, the answers to which spell the difference between leadership and lack of leadership among those upon whom the responsibility for leadership rests;—the difference between loyalty and lack of loyalty among the men who are on the "firing line," the men in the rank and file, down "where the wheels go 'round."

For many years I have recognized the necessity for constructive and coordinated thought and action along the lines I have suggested. I strongly favor the employment of a personnel officer and assistants whose time is devoted to these and other problems of a like nature. On our own railroad the duties of the personnel organization encompass the entire personnel field, namely, employment, wages and working agreements, safety, group insurance, employees' magazine, personal records, welfare activities—in fact, everything pertaining to the human relations problem. Our progress has been slow, it is true, but there has been progress. More and more attention is being given to the human element on our railroad; greater care is given the selection of men; more thought to their training, their welfare and their future.

As an illustration of our efforts to improve the caliber of men entering the service, we have recently established on a rather small scale a pre-employment training plan whereby high-school graduates, carefully selected, are brought in and given instruction in the rudiments of railroading, and with particular reference to our own property. When they have finished the course, they will be given first consideration for employment at the foot of the ladder.

The executive officers of our railroads need your help in finding a solution for the problem I have tried to place before you. It is not a problem for one man to solve, but is worthy of the best thought that can be brought to bear upon it by all.

I recommend to you that this association take steps to consider, actively and seriously, the problem of labor efficiency in all of its various ramifications, including those I have pointed out to you. I further recommend that at least one-third of the time of your business sessions be devoted to the reports of committees on this important subject, and discussion thereof.

By following the program I have suggested, I feel that the American Railway Bridge and Building Association can do the railroad industry of this country a real service, and the association will also have assumed its full share of the responsibility of leadership. We must have this leadership if we are to regain and retain that splendid spirit of loyalty which has, in the past, characterized the bridge and building organizations of our American railroads, and has been so largely responsible for their efficient and economical operation.

* President, Kansas City Southern.

Maintenance of Railway Roofs

Considerations entering into the economical maintenance of railway roofs of various types were discussed in the report of a committee headed by J. S. Hancock, bridge engineer, Detroit, Toledo & Ironton. Following

a preliminary discussion in which the committee emphasized the importance of protecting roof sheathing from decay by insuring against leaks in the roof itself, the report dealt separately with various types of roofs and roofing materials.

Referring to natural slate, tile or asbestos-cement shingle roofs the committee stated that "the life of a roof of any of these materials will approximate the life of the building and will depend chiefly on the life of the fastenings used." Roofs of tin and galvanized iron of good quality also give long service, the committee continued, if not exposed to deteriorating fumes or gases and if kept well painted.

The life of a wood-shingle roof, the committee said, can be extended slightly by the application of a good grade of creosote shingle stain. Where wood-shingle roofs have deteriorated to such an extent that it is not advisable to repair them the committee recommended that asbestos shingles be applied directly over the old shingles; it also stated that a good grade of slate-surfaced asphalt shingles can be applied satsifactorily over old wood shingles.

Roll roofing, it said, requires frequent inspection and considerable maintenance if the maximum life of the material is to be obtained. It recommended that such roofs be given one or more coats of liquid roof coater before the light oils have evaporated from the original asphalt. Mentioning that leaky seams are often a source of trouble, the committee stated that such seams may be replaced by applying plastic roof cement over them, embedding a strip of asphalt-saturated fabric, four to six inches wide, in the cement. Over this fabric, another coat of plastic roof cement should be applied, overlapping the fabric on all edges.

The pitch and gravel roof, in the opinion of this committee, is one of the outstanding long-life roofs of today. When applied properly, this type of roof should require little maintenance. If leaks should develop they can be repaired by clearing off the gravel and pitch down to the felt at the location of the leak, after which a patch, consisting of two or three layers of 15-lb. tarred felt, is mopped on with hot pitch, each successive layer overlapping the preceding one by at least 6-in. The top coating of pitch and gravel is then replaced.

When properly applied, smooth-surface, asphalt and rag-felt built-up roofs should require little or no maintenance for several years, according to the committee. Leaks in this type of roof may be repaired by mopping on two or three layers of felt, while plastic roof cement can also be used to good advantage. As occasion demands, the surfaces of such roofs should be given a top dressing of hot asphalt to insure long life. Good results are also obtained in repairing this type of roof by mopping on a coat of cold liquid roofing asphalt without fibre, in which asphalt-saturated cotton fabric is embedded and over which another coat of cold liquid asphalt is mopped.

The report included a list of general recommendations concerning the construction and maintenance of roofs. A comprehensive bibliography of material pertaining to the maintenance of railway roofs is appended.

Discussion

The discussion revolved largely around the application of prepared roofing and methods of preventing the splitting of the sheathing by the roofing nails. To avoid this, a number of roads apply prepared roofing up and down instead of horizontally. One member reported that this is his practice on all repair work, but that for new work the roofing is laid diagonally, and that this has been very satisfactory, having the advantage of avoiding the splitting of the sheathing boards. When discussing the question whether, in the renewal of prepared roofing, the old roof should be removed, the general consensus was that the new roofing should be laid over the old roof.

Recent Developments in Preframing Timber Bridges

One of the most comprehensive reports was that which reviewed current practice in the preframing of timbers for bridges, presented by O. W. Stephens, bridge supervisor on the Delaware & Hudson, and chairman of the committee that had been assigned this subject. The material presented was based largely on the replies to a questionnaire sent to 40 railways. Some consideration was given in the report to the advantages and economies of preframing, but primary attention was devoted to a discussion of the measures adopted by the roads in meeting the practical problems encountered, for, as stated by the committee, the successful preframing of timbers for trestles requires a high degree of accuracy in obtaining the necessary information to prepare the plans. The report described the varied forms used for this purpose.

General opinion, as developed by the committee, was that it is impractical to drive piles to exact depths and that, for this reason, it is useless to preframe and prebore treated piles. On the other hand, all the railroads reported that frame bents can be preframed before treatment and assembled in the structure without the reboring of holes. The information compiled developed that the trend is away from the use of drift bolts for fastening frame bents to piles, although they are still widely used. The replies to the questionnaire showed that about 95 per cent of the roads bore holes to prevent splitting of the timbers.

The committee developed that 90 per cent of the reporting roads have abandoned the use of spacer spools with treated stringers and that, while a number are using special devices for anchoring stringers to the caps, the majority still use drift bolts. The railroads that prebore the stringers for these drift bolts are about equal in number to those that bore the holes in the field.

The practice of preframing and preboring longitudinal and sway bracing is increasing rapidly where the bridge is composed of frame bents. About 75 per cent of the railroads are now preframing the bracing used with this type of bent. The committee recommended the use of a bolt hole treater or some other means of treating field-bored holes.

According to the committee the number of railroads using preframed and treated bridge ties is much greater than the number using preframed and treated timber in trestles but practice in handling the details varies widely. About half of the roads responding to the questionnaire frame the ties to clear the rivet heads, while the other roads allow the ties to seat themselves on the rivet heads.

About 30 per cent of the roads prebore ties for spikes and tie-plate fastenings, although the percentage of roads that prebore the ties for use on bridges located on curves is considerably less. A number of roads contend that the preboring of ties is not practical for steel bridges because of variations in steel work, that do not allow the ties to fit uniformly. However, the questionnaire brought out that a number of roads have installed trestles more than 1,000 ft. long in which all material, including the ties, was prebored and preframed.

The report also discussed the variations in the prac-

tice of boring ties for trestles and the various means employed for spacing the ties, and offered the following general observation on this feature: A large number of roads have obtained good results with prebored and preframed guard rails and prebored ties. These results may depend on the length of the structure, the type of bridge and whether or not any track curvature is involved. In any event, these roads are fairly well convinced that it is possible to preframe and prebore ties and guard timbers which will be correct after application. The committee also directed attention to the importance of careful field work, since the material must be handled and erected by bridge carpenters. Only through the proper organization and training of the men can the best results be obtained in the handling of treated material. The life of the structure depends largely on the precautions these men take in applying this material.

Discussion

The discussion developed largely around the possibility of assembling the preframed pieces in the field with assurance that they will fit. Examples of improperly located prebored spike holes were cited and it was stated that one road had overcome this trouble by assigning junior members of the engineering corps to make sketches for the preframing and to oversee the preframing operation for both steel bridges and trestles.

Under-Water Repairs to Bridge Piers and Abutments

The structures that are causing the greatest concern to maintenance men in regard to under-water repairs are masonry piers and abutments that were built from 50 to 80 years ago, according to a report on this subject presented by the chairman, E. C. Neville, bridge and building master, C. N. R. The committee also reported a greater degree of difficulty with concrete structures that were built prior to the advent of scientific methods of designing and mixing concrete.

The defects most frequently encountered which make under-water repairs necessary include scour around and under the footings of the structure; the washing out of mortar from horizontal joints, allowing the courses of stone to sag; the splitting or crushing of stones directly under the load applied on the bridge seat; and the dislodging of stones by heavy movements of ice.

The report stressed the importance of regular and thorough inspections. Defects of so serious a nature as to cause alarm and require prompt attention may appear unexpectedly and suddenly, or on the other hand may be the result of slowly progressive erosion. But, whatever the nature of the defect, the difficulty and expense of making repairs are increased by procrastination or delay.

The greater portion of the report was devoted to repair work, which was handled in the form of a series of detailed descriptions of corrective measures carried out on several structures that had been seriously undermined. These descriptions not only covered the methods of underpinning but also the procedure followed in unwatering the foundations, in spite of such obstacles as rip-rap and boulders. One account cited the dumping of stone ballast into the void around the foundation piles and the subsequent grouting of this stone filling. A comparable expedient was the use of cement and gravel, placed in burlap bags. Other illustrations embodied more conventional methods involving complete unwatering for the placing of concrete jackets. Summing up the committee made the following general observation:

Because of the difficulties encountered and the expenses involved in making major under-water repairs, it is important that frequent and thorough inspections be made so that steps may be taken to arrest the progress of any scour or erosion. In many instances a remedy may be applied at once in the form of rip-rap or bags of dry concrete, or by the caulking of joints, at low cost, thus removing the necessity for a major operation later.

Where there is evidence of scour that cannot be averted by the use of rip-rap, steel sheet piling should be driven around the structure and the space between the piling and the masonry filled with concrete by the "tremie" process, thus avoiding heavy coffer-dam construction and unwatering expenses.

Discussion

Comments on this report consisted largely of the recounting of experiences with bridge substructures that had failed because of scour. The consensus was that nothing should be left to chance with respect to such substructures and that if there is the least suspicion of serious damage, a diver should be employed to obtain an adequate picture of the condition of the structure. Various methods of repairing failed substructures were described, most of which applied to specific conditions.

Bridge Maintenance for High Speed Train Service

According to a report presented by George E. Boyd, associate editor of the *Railway Age*, as chairman of the Committee on Bridge Maintenance Methods for High Speed Train Service, experience in this field is so new that bridge maintenance forces have as yet had little opportunity to study the subject in all of its phases or develop a technic of bridge maintenance adapted to the new conditions. However, attention was directed to certain well defined trends that indicate a movement toward greater refinement in methods and more exacting workmanship. No drastic departures from current forms of organization or practices are anticipated. The report was divided into two general heads, one dealing with the effect of high-speed trains on structures and the other relating to methods of handling work so as to avoid interference with the schedules of fast trains.

Experience of members of the committee and others consulted tends to show an increase in the prevalence of minor defects, such as loose rivets, cracked connection angles and fractured pedestals in structures on lines carrying the new higher speed trains, and as a result the committee has reached the conclusion that vibrations caused by the fast trains have been a contributing cause of these failures. For these reasons it is recommended that steel bridges having open decks, including through girders and truss spans, be given more frequent and closer inspection to determine whether structural defects are present or are showing signs of development. It was also suggested that certain details of design will require modification.

Referring to the importance of a high degree of refinement in alinement, the committee asserted that trestles must be lined and the track surfaced more often. Chord and brace bolts must be tightened at shorter intervals, while in some cases it has been deemed advisable to increase the amount of sway bracing and to add tower and longitudinal braces on structures where they were not needed formerly.

For the same reason track approaches to bridges must

be given close and frequent attention. While the maintenance of the track off of the bridge is primarily a responsibility of the track forces, the bridge forces have a definite interest in seeing that it is done properly. If the track and bridges are maintained to proper line and surface, there will be no indications, so far as smooth riding is concerned, of the change from roadbed to bridge and vice versa.

Directing attention to the serious effects of slow orders on the maintenance of the schedules of high-speed trains, the committee addressed its report primarily to the measures that can be taken to conduct bridge repair and construction work with a minimum of interference with train operation. Touching on personnel, the committee urged the importance of alert foremen, stating that older men have fixed viewpoints and, in general, are incapable of adjusting themselves to new conditions.

The report also stressed the advantage of doing certain classes of work during seasons of light traffic, and of using power equipment, especially off-track appliances. In general, the suggestions offered comprised a restatement of the principles of good practice in bridge maintenance, whereby the work is done with the minimum loss of time or delay in the use of the structure by trains. Special attention was directed also to the requirements of falsework under the new conditions. It must be designed to carry trains at full speed for an indefinite period, rather than as a temporary structure over which speed must be restricted. This means that the structure must be stronger, better braced and of better material.

Recognizing that slow orders may be necessary despite all efforts to avoid them, the report urged that careful study be given to the plans for doing the work, (1) to provide for the highest speed allowable under the conditions surrounding the work, and (2) to develop a procedure that will insure that the speed restriction will be in effect for the minimum time. The committee also made an urgent plea for the exercise of full co-operation between departments as an essential for the expeditious handling of bridge work involving any interference with the use of track.

To permit safe and uninterrupted operation of high-speed trains and at the same time keep maintenance on an economical footing, every officer, both general and supervisory, each of course acting within his own sphere, must make it his concern. It is only by the complete elimination of departmental barriers and the coordinated interest of the departmental officers that both uninterrupted service and economical maintenance can be obtained at the same time.

Discussion

In this discussion of this report, a question was raised as to the committee's conclusion with respect to the damage done by high-speed trains, attention being directed to the fact that impact effects are not always proportional to speed and that the operation of various types of equipment over the same line precludes any accurate determinations of the effect of any one type. One speaker stressed the importance of organizing bridge work to meet the new operating conditions, as they are "here to stay."

[The remainder of the report of this convention will appear in the following issue.]

THE GREAT NORTHERN has purchased Jessup Mill, at Kalispell, Mont., including the mill site of 65 acres, lumber and flour mills, water rights and the mill pond, and will hold the site in anticipation of appropriations from the federal government for a brook trout hatchery, the fish of which will be used to stock the lakes of Glacier National Park.

Fire Protection Group Holds Meeting at Chicago

FIRE losses on the railways of the United States in 1935 continued the generally downward trend which has been evidenced for more than 10 years ago, according to a report presented by the Statistical committee of the Railway Fire Protection Association at the twenty-third annual meeting of the R.F.P.A., which was held at the Congress hotel, Chicago, on October 20-21. On the roads represented in the membership of the association—totalling 262,169 miles of line—fire losses in 1935 amounted to $3,631,610, as compared with $4,156,890 in 1934 and $7,524,250 in 1926, the latter figure being the highest recorded for any year during the decade ending with 1935. W. F. Hickey, president of the association, and superintendent of insurance of the New York, New Haven & Hartford, presided at the meeting. About 100 members and guests attended.

President's Address

After referring briefly to the reduced level of railway fire losses that has characterized recent years, President Hickey, in his opening remarks, pointed to the increased fire hazards resulting from the mounting freight and passenger business of the railroads and urged the members to intensify their efforts with a view to the achievement of a "still higher degree of accomplishment."

"It is essential also," he continued, "that the railroad managements continue to endorse and support the activities of the R.F.P.A., although it is gratifying to acknowledge the cordial support which has always been accorded by the railroad managements, and to broadcast the fact that the railroads have spent large sums in fire prevention and protection, which has been a factor in making railroad travel the safest form of transportation." Lower operating expenses and increased efficiency also reflect reduced fire losses, he said, "as keeping the fire loss low not only saves property but avoids handicaps to operation, reduces expenditures for temporary facilities, helps avoid delays to patrons and freight and tends to prevent traffic from moving via competitive lines of transportation."

The perennial question before this association—that of affiliating with either the Association of American Railroads or the National Fire Protection Association—was discussed briefly at this meeting. President Hickey reported that the matter has been placed before the A.A.R., but that no action has been taken by that body.

As the present officers continue in their posts for another year, the election of officers at this year's meeting was confined to the selection of two executive committee members. These are R. R. Hackett, superintendent of insurance of the Baltimore & Ohio, (re-elected), and G. A. W. Achenbach, assistant secretary, Erie, who succeeds E. M. Strauss, fire protection engineer, Union Pacific. The officers of the association, in addition to Mr. Hickey, are: Vice-president, W. A. Radspinner, supervisor of fire prevention, Chesapeake & Ohio; and secretary-treasurer, P. A. Bissell, Maine Central.

Statistical Report

The report on statistics, which was presented by J. E. Fraser, general fire protection agent, Boston & Maine, and chairman of the committee, showed that for 1935, the 65 reporting roads had 4,829 fires which resulted in a total loss of $3,273,927. For 1934, 66 roads reported 5,543 fires and a total loss of $3,667,609. Based on the foregoing figures for 1935, the average fire loss per mile

of line in that year was $13.85; the total loss for all member lines, which was given in the first paragraph, is based on this per-mile average.

First place among the causes of fire damage in 1935 was held by "wrecks," to which losses of $490,297 were attributed. This is a deviation from the experience of recent years in that in 1934 and 1933 more fire loss was attributed to "trespassers" than to any other single classification. Last year the fire loss attributed to "trespassers" ($385,319) was second, while that assigned to "exposure" ($307,039) was third. Other principal causes of fire were "incendiary" ($269,872), "spontaneous ignition" ($262,606), and "electric power and motors" ($164,466). Fires from unknown causes were responsible for damage amounting to $423,065. Fire losses inflicted on fixed properties, caused by 1,940 fires, totalled $1,844,282, while 2,266 fires damaged rolling stock to the extent of $1,197,520.

Frank J. Prindiville, engineer for the Chicago Fire Prevention Bureau, declared that 85 per cent of all fires are preventable. Accumulations of rubbish, he said, cause one-third of all fires while other important causes—all preventable—include carelessness in handling lighted smoking materials, the improper installation of electrical equipment, and inadequate maintenance of heating systems.

"Round Table" Discussion

As in past years an important feature of this meeting was the "round table," or informal discussion of various phases of fire prevention work. Under this heading the most comment was forthcoming during the discussion of the hazards involved in shipping and using liquified petroleum gases (butane and propane). Both gases are coming into wide use on the railroads, as well as in industry in general. Heading the discussion of this subject, H. E. Thomas, Phillips Petroleum Company, stated that it is important, in shipping liquified petroleum gas, to employ the proper equipment and connections on tank cars, particularly during loading and unloading. The consensus seemed to be that such precautions as the display of the blue flag and the use of derails and insulated and bonded joints on the unloading track are sufficient, but that bottling plants for these gases should be kept as far away from the track as is demanded by rules applying to the handling of casing head gasoline.

Referring to fire losses that have been suffered in buildings under construction, W. F. Steffens, chief fire protection engineer, New York Central System, in an informal discussion, emphasized the need for subjecting timber for use in construction and in staging to a fireproofing treatment. He called attention to a recently perfected process, involving a cylinder treatment, by means of which timber for interior use is rendered highly fire resistant.

Through the inauguration of improved methods of handling salvage, the railroads can obtain better prices and greater returns from the sale of damaged lading, said W. P. Forbush, Underwriters Salvage Company. He urged that trainmen be given instruction in the proper handling of merchandise during wrecks and fires, and contended that better prices for salvage can be obtained if it is sold at concentration points rather than locally.

Fire Protection Education

Speaking informally on Fire Protection Education, Prof. J. B. Finnegan, Armour Institute of Technology, Chicago, described the course in fire protection engineering offered at that institution. Instruction in the fundamentals of engineering forms the basis of the course, he said, with additional instruction being given in chemistry and other pertinent subjects. Students enrolled in this course usually work as fire inspectors during summer vacations and are also given an opportunity to study in the Underwriter's Laboratories. About 90 per cent of the graduates of this course are engaged in the fire insurance business, according to Prof. Finnegan.

Some of the problems encountered in securing approval of expenditures for fire prevention and protection systems were recounted in a paper read by L. B. Allen, assistant to vice-president, Chesapeake & Ohio. It is difficult, he said, to show an actual return on investments for fire prevention; the justification for such expenditures must, therefore, be based on the "supposition that there is a *chance* of a fire and that the loss *may* be a specified amount." Again, said Mr. Allen, "there is a proneness in our personal affairs, which perhaps extends into our business affairs, to a smug feeling that 'it is fully insured—so what?'" His answer to this query is that "fire protection reduces insurance premiums and costs, and that frequent fire losses boost insurance costs."

Recent improvements in the facilities of the Underwriter's Laboratories were described by A. R. Small, president, after which he analyzed briefly some of the fire protection and safety problems presented by the widespread use of air-conditioning systems. Instances have been encountered, said Mr. Small, where the oil in the intake filters of air conditioning plants has become ignited, one such instance resulting in a fire in a theatre in New York. The design of non-inflammable materials for lining air ducts presents another phase of the same problem, he said.

Stating that the "claim agent's dollar cannot replace commodities that have been destroyed by fire," Joe Marshall, Freight Claim division, A.A.R., emphasized the necessity of impressing on the minds of the employees the need for exercising caution wherever there is a fire hazard. For accomplishing this too much reliance should not be placed on annual fire prevention week, he said; rather the education of the employee should be continued throughout the year.

He advocated the publication of more fire-prevention educational material in employees' magazines, the mention of employees reporting fire hazards, the wider use of posters, and the supplying by fire-prevention experts of "talking points" to supervisors who can then pass them on to employees during meetings. Employees, he said, should observe rules pertaining to the control of smoking, should be familiar with the location of fire alarm boxes and the use of fire-fighting equipment, and should have a knowledge of the causes and effects of spontaneous combustion.

Pointing to the fact that modern locomotive cabs contain expensive equipment that is easily damaged by fire, the report of the Committee on Locomotive Fire Hazards considered the question of controlling fires in cabs caused by the ignition of the storm curtains. Mr. Radspinner was chairman of this committee and presented the report. Following a discussion of the various ways in which cab curtains catch fire, the report summarized the progress that has been made in developing fireproof material from which cab curtains can be manufactured. The report described how samples of fire-proofed material were subjected to an accelerated weathering test covering 240 hr. and then brought in contact with flame in various ways to determine the effectiveness of the fire-proofing.

Brief reports, which were followed by the usual informal discussions, were presented by other standing

(Continued on page 641)

A. C. Needles Dies; W. J. Jenks Becomes President of N. & W.

Former, chief executive since 1924, was 69 years of age and had been with road for more than 50 years

ARTHUR C. NEEDLES, president of the Norfolk & Western since May, 1924, died on October 25 at his home in Roanoke, Va. He was 69 years of age and had been associated with the N. & W. for more than 50 years. Death was due to a heart affection resulting from bronchial asthma.

At a special meeting of the N. & W. board of directors, held at Roanoke on October 27, William J. Jenks, vice-president in charge of operation, was elected president to succeed Mr. Needles. Consideration of further organization changes was deferred until the November meeting of the board.

Arthur C. Needles

William J. Jenks

Except for one-year's service in 1882 with the Washington, Ohio & Western (now a part of the Southern), Mr. Needles' entire career has been with the Norfolk & Western in the service of which he rose from the position of rodman to become the successor to N. D. Maher in the presidency.

In 1933 Mr. Needles, having completed 50 years of continuous service with the road, was awarded the diamond insignia of the Norfolk & Western Veterans Association. This presentation was made on behalf of the N. & W. board of directors by the chairman of its executive committee, the late D. W. Flickwir, who told Mr. Needles that of 82 chief executives listed in Who's Who in Railroading, "only one besides you has served the same railroad for as many as 50 consecutive years."

The Norfolk & Western has always been cited as an outstanding example of a prosperous and ably-managed railroad property. And its reputation as such has been further enhanced during Mr. Needles' term which included the difficult years of the unprecedented business depression. It maintained throughout 1930 and 1931 the $12 dividend on its common stock, which it had paid in 1929. For 1932 this common dividend was dropped to $9 but in 1933 it was up to $10 where it has since remained. Meanwhile gross revenues had fallen from $117,631,751 in 1929 to a low of $62,775,611 in 1932 but expenses were at the same time reduced from $66,051,247 to $37,745,533.

But such prosperity does not "just happen." In addition to the fact that the road is fortunately placed with respect to available traffic the management under Mr. Needles and his predecessors has pursued a consistently conservative policy with respect to the utilization of a generous portion of earnings for both the reduction of bonded indebtedness and the building of the property. In 1924, for example, the investment in road and equip-

ment was $360,663,549 while the long-term debt totaled $89,288,500 and capital stock $157,786,600. By the close of 1935 the property investment had increased to $456,405,353 while the long-term debt was down to $46,066,500 and the capital stock up to only $163,640,600.

Arthur C. Needles was born on January 10, 1867, at Baltimore, Md. After attending the public schools and Swarthmore College, he entered railway service in 1882 as a rodman on the Washington, Ohio & Western. In the following year he became associated in the same capacity with the Norfolk & Western, thence remaining continuously in the service of that road until his death. Going to Roanoke in 1884, Mr. Needles became a yard clerk, then took a job as brakeman and was soon promoted to yardmaster. Later he was sent to Pulaski, Va., as yardmaster and in 1889 he went to Bluefield, W. Va., in the same capacity. On August 1, 1890, he was appointed assistant trainmaster and was in charge of the Clinch Valley line for some time. His next promotion came Christmas day, 1898, when he was appointed trainmaster, Radford division. On May 22, 1901, he became assistant superintendent of the Pocahontas division and exactly a month later he was chosen as superintendent of the Shenandoah division. On October 6, 1902, he was transferred to the Norfolk division and on December 16, 1902, he was transferred to the Pocahontas division, serving as superintendent in each instance. Thus, he was superintendent on three different divisions within a period of a little more than two months. On February 1, 1904, he was appointed general superintendent of the entire system.

He was advanced to the position of general manager on December 1, 1912, and was promoted to operating vice-president on January 1, 1918. On June 1, 1918, he was appointed federal manager under the United States Railroad Administration, holding that position until March 1, 1920, when the railroads were returned to private operation. He then resumed his position as vice-president in charge of operation. On January 1, 1921, he was given charge of the traffic department in addition to his other duties, with the title of vice-president in charge of operation and traffic, the position which he retained until he assumed the presidency.

William J. Jenks

William J. Jenks, who succeeds Mr. Needles in the presidency, has been vice-president in charge of operation throughout the latter's entire term as chief executive. He was born on March 21, 1870, near Raleigh, N. C., and was educated in public and private schools. He entered railway service in November, 1886, as a telegraph operator and agent, serving at various places consecutively on the Raleigh & Augusta Air Line (now a part of the Seaboard Air Line), the Richmond & Danville (now a part of the Southern) and the Norfolk & Western. From 1887 to September 15, 1901, he was successively agent, agent-operator, train dispatcher, chief dispatcher and car distributor of the Norfolk & Western. He then became a trainmaster of the Seaboard Air Line at Savannah and Americus, Ga., and Jacksonville, Fla., and in January, 1904, he was promoted to superintendent at Jacksonville Fla., and Raleigh, N. C. In March, 1908, he was appointed chairman of the car allotment commission of the Norfolk & Western and in May, 1912, he was appointed superintendent of the Pocohontas division. In December, of the same year, he was promoted to general superintendent of the Western general division and on January 1, 1918, Mr. Jenks was promoted to general manager at Roanoke, the position he held until his election as vice-president in charge of operation on May 1, 1924.

Salesmanship and Its Bearing on Railroad Transportation

By T. W. Evans*

THE rules of many of the railroads, which follow, indicate how much railroad managements appreciate the necessity for good will.

"The service demands the faithful, intelligent and courteous discharge of duty.

"To obtain promotion, capacity must be shown for greater responsibility.

"The public judges a railroad very largely by the treatment it is accorded by the employee representing the railroad, in whatever capacity employed.

"The good will and friendship of the communities served by this railroad are its most valuable assets; and the strongest recommendation for promotion an employee can possibly have is the fact that by uniform courtesy and kindly accommodation of patrons he has secured for himself and for the railroad the good will and friendship of the community in which he is located."

Some critics say it is difficult to eradicate the idea of monopoly from the minds of many in the service. However, those of us who have spent our lives in railroad service and know the employees intimately, are constantly trying to have the officers and employees get the public viewpoint.

For years, the railroads have been charged with poor salesmanship. The dictionary defines "salesmanship" as the ability to sell goods or services, and to be successful as a salesman it is considered that one must not only have something to sell, but he must also convince and satisfy the purchaser. An institution that has been a training school for so many railway equipment representatives, industrial traffic managers, leaders of railroad employee organizations, politicians and the clergy, possesses the germ of salesmanship judging by the success so many have attained after graduating from the railroad ranks.

Let us consider for a moment the value of a position with a railroad. The average compensation per employee for the year 1935 on class I railroads was $1,653.18. If we capitalize that at 5 per cent, it indicates the value of the average position is $33,000. If the employee receives $2,400 a year, it indicates a value of $48,000. Is there another industry in which the employee has the security under seniority rules that a railroad employee enjoys?

With the public demanding lower rates to permit wider distribution of all commodities, thereby increasing the volume of business moving, and requiring more employees, locomotives and cars, we find the railway labor organizations urging: a six hour day bill, a train limit bill, a full crew bill, an hours of service bill, a track and bridge inspection bill, a signal device bill and a train dispatching bill, which, if enacted, would bankrupt the railroads. This in face of the fact that railway labor today receives an average income of almost 50 per cent more than the average income of all classes of persons in this country.

What is the matter with our salesmanship? Individually, many employees I talk with do not approve such proposed measures, but, collectively, they blindly follow the leadership of their organizations, which frequently do not "stop, look and listen" before taking ac-

* Vice-president, New York Central System. From an address before the Western Railway Club on October 19, 1936.

tion that is not only detrimental to their employers, but to themselves.

Why have these men strayed so far from sound principles? There is no criticism today of any employee's becoming a member of a labor organization, but it is lamentable that after joining he does not participate in its activities, but instead, trusts his future to a few who are glib of tongue. The railroad industry has great vitality. Think for a moment of the difficulties it has overcome. For many years there was insistent demand they be regulated. This resulted in the Interstate Commerce Commission and 48 state commissions. Restrictive legislation followed.

Prompt Consideration for Rate Change Proposals

(*Continued from page 621*)

have incurred heavy deficits if they had been deprived of the revenues resulting from the emergency charges."

Another exhibit showed "that although the rate of return on property investment for the first eight months of 1936 of 2.3 per cent (which would have been only 1.8 per cent in the absence of emergency charges) is more favorable than the corresponding figure during the depth of the depression, it compares very unfavorably with the rate of return of 4.67 per cent for the average year in the five-year period 1925-1929."

"It also appears," the petition continued, "that the net income for the eight-month period of $16,400,000 (which would have been a deficit of $60,600,000 in the absence of emergency charges) is to be compared with an average annual net income of $773,283,114 for the period 1925-1929.

"Further light is thrown upon the financial condition of the railroads by the fact that companies having aggregate mileage of more than 70,000 miles, constituting 28 per cent of the total railroad mileage in the United States, are now in the hands of trustees or receivers.

"The emergency charges were authorized by this commission upon a showing by your petitioners that operating expenses, on the basis of 1935 business, had increased by some $260,000,000 as a result of increased unit labor costs and increased unit prices of materials and supplies. The unit costs of railway labor are now the same as at the time of the previous showing, and the unit prices of materials and supplies are slightly higher. The increased operating costs, due to these increased unit costs and prices, on the basis of 1936 business, will be more than $300,000,000."

Fire Protection Group Holds Meeting at Chicago

(*Continued from page 638*)

committees. T. E. Chapman, Jr., Norfolk & Western, in presenting the report of the Handbook committee of which he is chairman, reported progress in the work of revising the handbook and said that portions of the revised book were ready for printing. Criticism of the handbook was voiced by E. Williamson, Southern, who said that references to specifications of the National Fire Protection Association are not sufficient and contended that the complete information should be given in the handbook. However, other members held that, because of the large amount of information to be treated, it would be impracticable to bring it within one volume.

Following the presentation of a progress report by the Committee on Storage of Records, of which J. L. Rice, Reading, is chairman, Mr. Steffens cautioned the members against unqualified acceptance of the dictum that all safes constructed prior to 1917 are obsolete. There are many exceptions to this rule, he said, particularly where the safe is supported on a foundation that will not collapse in the event of fire. L. J. Molloy, assistant treasurer, Seaboard Air Line, pointed to the fire hazard created by the accumulation of useless records and said his slogan is: "Remember a Useless Record Is a Needless Fire Hazard."

Reporting for the Committee on Gasoline and Gas Pipe Lines, of which he is chairman, Mr. Steffens suggested that members of the association note carefully any failures of pipe lines that may occur in the territory under their observation and to report such failures to him.

Other subjects considered at this meeting included Diesel engines, oil stoves in cabooses, fumigation of elevators, and shop plants.

New Books...

Old Wires and New Waves. By Alvin F. Harlow. 548 pages, 6 in. by 8½ in. Cloth, Illustrated. Published by D. Appleton-Century Company, New York. Price, $5.

This book is a valuable summary, for the general reader, of the history of three of the most notable inventions of this age, the telegraph, the telephone and wireless communication; reduced to 500 pages by a thorough, careful and well-informed writer who must have studied literally hundreds of historical publications issued before he was old enough to read history: and who with equally skillful hand has condensed the more modern history; that is, the inventions made since Marconi came upon the scene. The somewhat modernistic title does not do the book justice; the subtitle is more exact and better—"History of the Telegraph, Telephone and Wireless."

The thoroughness of the author's work is indicated at the outset by 21 pages devoted to the semaphores, beacons, fires and other devices used in various parts of the world, before the electric current had been harnessed to convey words quickly to a distance. In connection with the opening of the Erie Canal, in 1825, news was sent from Buffalo to New York, 440 miles, in 80 minutes, by firing cannon.

The three subjects are dealt with chronologically, and do not overlap a great deal. The telegraph takes up 183 pages—35 to 218—including chapters on the Associated Press and "The Telegraph and the Railroad." (Charles Minot, sending the first train order from Turners, N. Y., on the Erie, in 1851, sent the message by a commercial line, and is said to have paid regular tolls for it.) The railroads were slow in appreciating the telegraph. The telephone, the Atlantic cable and experiences in the civil war make exciting chapters, and law suits enliven many pages throughout the book. Capitalists striving for the mastery of the commercial telegraph business in the United States made a lot of history in the years 1875-1914; and from 1883 John W. Mackay was a chief figure in this history.

The telephone is allowed less space, proportionally, than the telegraph, partly because it did not astonish the sophisticated world of 1880 as did the telegraph the world of 1830-1850, and also presumably because the reader is assumed to be less in need of stimulating reading on the subject. The same is true of the wireless. And both the telephone and the radio arts, still rapidly growing, are not yet fully ready for the historian. Every page, however, of the chapters on these subjects is full of interest.

"Heroic service by wire and wave" constitutes a stirring

chapter, beginning with the reprieve of a condemned prisoner in 1851 and following through the Johnstown and other floods, and the world war, to earthquakes, floods and other crises in recent years. "The Palace of Aladdin," the last chapter, gives us 25 pages of varied seeming miracles performed daily almost under our noses, in telephone offices, telephone and wireless shops and on the ocean; yet still miraculous, though familiar.

Some of these most striking manifestations of electric magic in the modern business world employ the same fundamental principles as were brought out in 1850 and before. The modern ticker and teletype apparently were quite clearly seen by Hughes, developer of the printing telegraph 90 years ago: and the automatic telephone exchange of today, using a roomful of apparatus to make a single call, employs mostly principles as simple as the common relay of 1844.

The stories of untold millions of money spent on litigation between rival inventors remain in the reader's mind as he closes the book. The story of the Morse telegraph is largely one of experimenting in which ignorance is especially prominent. Everybody had in his head a mountain of ignorance, yet everybody who took a real interest saw what an epoch-making invention was in the air; and so everybody pressed on, through thick and thin. In the telephone litigation, forty years later, there was apparently less ignorance, but the immediate financial stakes were immensely greater. Twentieth century financial ventures are so vast that the common man scarcely tries to inform himself about them.

Self-contained and technical descriptions of completed instruments or apparatus are conspicuous by their absence; but only a moment's reflection is needed to see that this is inevitable, for these would require a volume by themselves. The author goes carefully to the bottom of every important question, not shunning to elucidate controversial points and giving his opinion where an opinion is appropriate. But the reader never has reason to complain of too much opinion or other matter to divert attention or dilute the story.

The illustrations in the book, 71 of them, (when the author must have been tempted to use hundreds) are very well selected. The frontispiece is a group of portraits of the three notables, Morse, Bell and Marconi. The Morse picture is from the photograph in the familiar overcoat, standing by the register. Bell is young, with side whiskers, and Marconi is also young. Joseph Henry, who, as inventor of the electro-magnet, is thought by some to deserve to stand by the side of Morse, is dealt with elsewhere in the book, as is Elisha Gray, who came within an ace of beating Bell to leadership in the hall of fame.

Second Progress Report of the New England Committee on Marine Piling Investigation. 8½ in. by 11 in., 249 pages. Bound in cardboard. Published by the Committee, 150 Causeway street, Boston, Mass. Price, $2.

In 1934, the New England Committee on Marine Piling Investigation, embracing the New England railways, several states, municipalities, industries and special collaborators, was formed to investigate marine borer activity in New England waters which had been reported as increasing at an alarming rate. The second progress report of this committee has now been issued, which covers the investigation during 1935 and up to March 1, 1936. This report, like the first report, not only presents a comprehensive discussion of the conditions prevailing within the period covered, but also includes complete details concerning the procedure followed in making the investigation, the various types of test boards and blocks employed, and, in addition, papers on special phases of the subject by special commentators.

According to the report, while certain areas in New England have witnessed a quite marked decrease in the activity of certain types of marine borers, for New England as a whole, there continues an increasing severity of attack of marine structures. According to Dr. William F. Clapp, consulting biologist, who is assisting the committee, ten million dollars is a conservative estimate of the cost of repairs now being made or contemplated on structures in the New England area, due solely to the ravages of marine organisms.

The report is another valuable contribution to the important study of marine borer activity, and will, unquestionably, be of interest and benefit to anyone having to do with the construction and maintenance of marine structures.

Odds and Ends . . .

Pigeon Fancier

George Westlake, piper in the Southern Pacific Shops at Sacramento, Cal., is one of the country's outstanding trainers of homing pigeons. In the last 50 races entered, his birds have finished first 37 times, and, in many cases, taken second and third places as well.

Small Railroads

In connection with small railroads, the appropriately named Chicago Short Line should not be overlooked. This line, 1.12 miles long, operates in the steel mill section of South Chicago, and owns 10 locomotives, 53 freight cars and 1 caboose. So busy has the railroad become with the reviving industry in the steel district that it now employs 100 men.

A Useful Toy

In Russia, a regular railroad, broad gage, complete with cars and locomotives, has been built between two stations two miles apart. This line is being managed and operated entirely by children. Boys and girls of under sixteen form its entire executive and operating staff, and it engages in regular railroad business as a course of training for the youngsters.

Dogs on Trains

The Baltimore & Ohio is the first railroad to make an exception against the rule against dogs in passenger cars. The exception is in favor of the remarkably intelligent dogs now being trained in large numbers to serve as companions and guides for the blind. Instructions are to treat these amazing dogs as nearly like human passengers as possible.

Co-Incidences

On April 12, 1935, G. A. T. X. tank car 12153, loaded with blackstrap molasses from Harvey, La., moved to Virden, Ill., via Gulf, Mobile & Northern and Chicago, Burlington & Quincy. On September 2, 1936, the same tank car, from the same consignee to the same shipper, moved in the same train over the same route.

On June 10, 1936, C. & O. 106 was loaded with slack coal from Wheelwright, W. Va., to the docks at Toledo, Ohio. On June 17, the same car was again shipped by the same shipper to the same consignee, over the same route.

Engineman-Physician

John H. Cavins, engineman for the Chesapeake & Ohio, is probably the only engineman in the country who has also had a career as a practicing physician. Cavins has been an engineman since 1886, and drove the first C. & O. passenger train to be operated between Lexington, Ky., and Louisville, between which points he still runs. About 1900, however, he became interested in medicine, and graduated from the University of Kentucky medical school. On leave of absence, he practiced for three years, but the lure of railroading was too strong, and Cavins returned to the throttle, where he has been ever since.

Four Who Started Together

Back in the 1890's Sam Mitchell, Edward Dulaney, Edward Wigand and F. T. Alexander, four lads, started their business careers in the Louisville & Nashville freight station at Bowling Green, Ky. As the years rolled by their destinies led them far apart, but now, after some 40 years, they are back under one roof, each older, wiser and holding a position of responsibility.

Mr. Mitchell is now vice-chairman of the Southern Freight Association, Mr. Dulaney is chairman of the Southern Classification Committee, Mr. Wigand is division freight agent for the Louisville & Nashville and Mr. Alexander is division passenger agent. All four have offices in the same building in Atlanta, Ga.

NEWS

321 Revenue Passengers on Trip to L.V. Shops

Railroad "fans" excursion from New York to Sayre, Pa., on October 25 well patronized

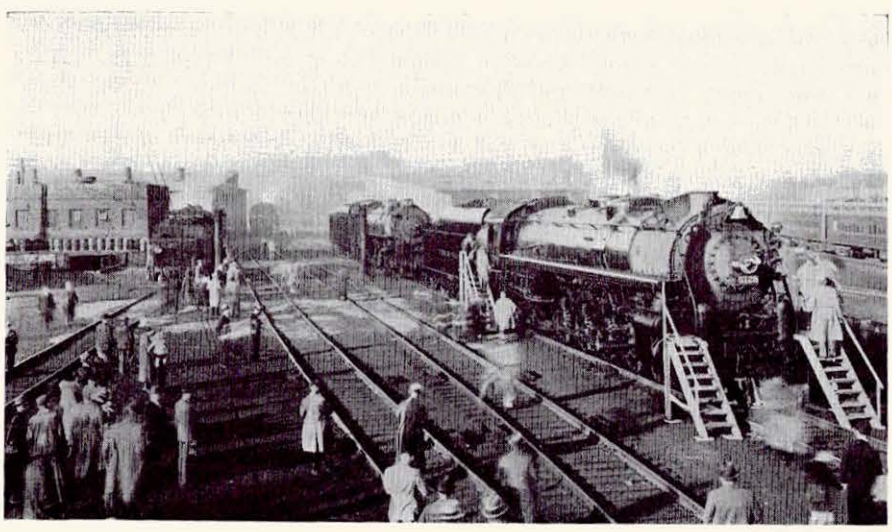
A total of 321 persons paid $5 each on Sunday, October 25, for the privilege of riding on a special train out of New York to visit the Sayre, Pa., shops of the Lehigh Valley. Interested railroad men brought the total number on the train to about 400. This trip, sponsored jointly by the New York Chapter of the Railway & Locomotive Historical Society and Railroad Stories Magazine, was planned by, and for the "fans," all operating details and the entire program having been worked out by the sponsoring organizations in collaboration with the officials of the railroad.

The train consisted of eleven cars. A combination coach and baggage car was at the head end, with a cafeteria counter for the serving of sandwiches and coffee, etc., set up in the baggage compartment. Four day coaches followed, then two diners, three day coaches, and an observation car on the rear. Large placards in the windows announced the purpose and destination of the trip.

By request of the sponsoring organizations, the train departed from Lehigh's Jersey City, N. J., yards so as to enable the party to see those facilities, and to traverse a portion of the railroad having no passenger service. The train left at 9:25 a.m. and stopped at Newark, N. J., and Bethlehem, Pa. Special cars were reserved for passengers boarding at those points to prevent crowding.

After leaving Jersey City each member of the party received a souvenir booklet containing historical and operating facts pertaining to the Lehigh Valley. Instruction sheets were also issued, telling of the dining service available and the program at Sayre. Five hundred meals were served in the two diners, with the cafeteria car also busy all day. Each member of the party received a diagram of the yard and shop buildings. Another feature of the arrangements was the issuance of pink identification cards to those desiring to take photographs, and blue cards for those who wanted to inspect the shops immediately. This made it easier for the shop guides, and also permitted the taking of photographs when the light was at its best, without interference from other persons. The locomotives on exhibition were carefully spotted. The 5128, a 4-8-4, had steps and platforms built around it to enable all to climb over a large modern locomotive. Many of the most interesting operations in the shops were carried on for the benefit of the party. Due to the widespread publicity given the trip, over a hundred persons from the surrounding territory were on hand to welcome the special train, and join the party for the inspection tour through the shops. The roundhouse whistle warned the party—first that in ten minutes the train would leave, then again that only five minutes remained.

For the convenience of the party, the return train operated into the Pennsylvania Station, New York, the regular terminal for the Lehigh's through passenger trains.



Looking Over The Lehigh Locomotives at Sayre

N. & W. Employees Confer on Duties as Citizens

350 delegates from all over system hold sessions at Roanoke October 16 and 17

At Roanoke, Va., on October 16-17, 350 representative employees of the Norfolk & Western, from 54 points on the system, gathered for the annual "better service" conference. The meeting was built up around the idea of better citizenship by the railway's employees—particularly with reference to employees participating actively in local, state and national political and governmental affairs.

The keynote address was delivered by W. J. Jenks, vice-president in charge of operation (whose election to the presidency is announced elsewhere in this issue). To give each delegate an opportunity to participate actively in the deliberations of the conference, they were divided into 15 committees, each of which was assigned for intensive discussion and recommendation some particular phase of the railway's problem. Mr. Jenks spoke in part as follows:

"Better railway service, in its broader sense, *must include* better citizenship. Better citizenship results in better government. And better government directly affects every individual in this country. It directly affects our economic system and our standard of living. It affects every industry and every business—big or little. Therefore, better government directly affects *your* railroad, and in turn, *your* individual welfare and the welfare of your family. That is why we must take a keener and a more active interest in the affairs of our government—local, state and national.

"I think we covered this subject thoroughly at the Virginia Beach meeting last year. Out of that conference came suggestions and plans. One of the immediate results was the organization of four regional Better Service Committees, which meet monthly at Norfolk, Roanoke, Bluefield and Portsmouth. Each committee has 25 members, each member serving for three months. Forty-eight regional meetings will be held during this year. So far, 285 employees have served on these committees. They are doing an excellent job. They discuss and plan ways to improve safety, to increase individual efficiency on the job, to get new business, and to improve our relations with one another, and with the public we serve. They have studied and canvassed current railroad problems. They have investigated

the records of candidates for public office. They have urged their fellow-employees to prepare themselves to vote. Moreover, the gospel of Better Railroad Service and Better Citizenship has been carried over the entire railway as a result of these meetings.

"Business of the country is slowly recovering from a terrific setback. The railroads are coming back, along with other business. If other business continues to improve, the railroad industry will continue to improve. For as the country goes, so go the railroads."

There were other addresses by R. H. Smith, general superintendent of the Western Division; S. F. Small, vice-president in charge of public relations, and J. P. Fishburn, publisher of the Roanoke Times-World and an N. & W. director. Among the subjects discussed and reported upon by the employees' committees were the following: Safety; Orderliness; Character; Friendliness; Recreation and Health; Duty to Employer; Relations with Other Employees; Saving Waste; New and Old Business; Employer's Problems; Good Citizenship; Ascertainment of Legislators' Stand; Reciprocal Duty; and Precision Transportation.

Club Meeting

The Toronto (Ont.) Railway Club will hold its next meeting at the Royal York Hotel, Toronto, on Monday evening, November 23. W. A. Newman, mechanical engineer, Canadian Pacific, will speak on the railway equipment of the future.

Correction

The news item entitled "Carlisle, Pa., Celebrates Removal of Trains from Its Main Street" which appeared in the *Railway Age* of October 24, page 606, stated erroneously that the Pennsylvania tracks had occupied High Street, Carlisle, only since 1887. The year should have been given as 1837.

Average Per Diem Plan Attacked

The Port Huron & Detroit, a short line, has filed a complaint with the Interstate Commerce Commission against the railroads participating in the average per diem agreement, requesting the commission to require them to pay it $1 a day for the use of its cars when on the lines of defendants and to establish reasonable rules for such use. It alleges that under the average plan it receives for its cars only approximately 75 cents a day, while it is obliged to pay for the use of foreign cars on its line approximately $1.26 a day.

New Central Vermont Subsidiary

The Interstate Commerce Commission has authorized the formation by the Central Vermont of a new subsidiary—Central Vermont Terminals, Inc.—which will be the operating company in New York for the Central Vermont and Grand Trunk-Canadian National differential route. The new terminal company has been authorized to take over and operate Pier 29, East river, New York, and it will also assume all trucking contracts now held in New York under the name of the Central Vermont Transportation Company.

W. H. Wickett, westbound agent of the Central Vermont, Grand Trunk, and Canadian National at New York, will be general agent in charge of pier operations for the terminal company which will commence operations on November 1. The terminal company is a Vermont corporation and its officers are all executives of the parent railway.

Automotive Traffic Men Show Concern Over Car Supply

Traffic managers of automobile manufacturing companies expressed concern over prospects for an adequate freight car supply at a meeting held in Detroit, Mich., on October 22. It was brought out at the meeting that the production of automobiles in Michigan and neighboring territory during 1936 would require the railroads to furnish 85,848 freight cars to handle their proportion of this production. Meanwhile another 61,245 cars will be required to serve main factories and assembly plants outside the Michigan district, thus making a total of 147,043 cars required by the entire industry.

Commenting on the situation, J. S. Marvin, general traffic manager of the Automobile Manufacturers Association, said that "it will be necessary for the railroads to give close attention to the prompt movement and return of their cars to the factories without delay, if they are to participate as fully as they should in this attractive revenue that is offered to them by the automobile industry."

Review History of Passenger Stations at Chicago

The history of the six railway passenger terminals at Chicago was the subject of a joint meeting of the Engineering History division of the Western Society of Engineers and the Chicago chapter of the Railway and Locomotive Historical Society at Chicago on October 21. The story of each of the six stations was presented individually as follows: The Grand Central Station Group, by Armstrong Chinn, chief engineer, Alton; the North Western Stations, by F. W. Hillman, assistant engineer of maintenance, Chicago & North Western; the Dearborn Street Station Group, by G. C. Hughel, chief draftsman, Chicago & Western Indiana; the Central Station Group, by C. H. Mottier, engineering assistant, Illinois Central System; the La Salle Street Station Group, by Frank J. Nevins, valuation engineer, Rock Island Lines; and the Union Station Group, by A. B. Olson, valuation attorney, Chicago Union Station.

Pennsylvania Off-the-Beaten-Track Excursion

Notwithstanding threatening weather, 343 passengers took advantage of the second "off-the-beaten-track" excursion operated by the Pennsylvania from Chicago, on October 25, to Monticello, Ind., Culver, and through the northern Indiana countryside. The tour included a three-hour stop in Culver, where the cadets of the Culver Military Academy, together with their band and their famous Black Horse Troop, passed in review before the assembled excursionists. Another feature was an exhibition of old and modern locomotives at Van, Ind., near Logansport.

I. C. Bicycle Train Well Patronized

More than 240 cyclists patronized Chicago's first bicycle train, operated by the Illinois Central from Chicago to Kankakee, Ill., on October 18. The group left Central station on a special train at 8:30 a.m., taking their own bicycles or renting them at the station. On arrival at Kankakee the cyclists enjoyed a 17 mile trip through the Kankakee valley. Luncheon was provided at Hieland Lodge, where the cyclists were convoyed by a special escort of highway police. The youngest cyclist in the group was seven years old, while the oldest has been a bicycle enthusiast since 1893. Plans for other trips for cyclists in the near future are being considered by the railroad.

Bus Certificate Denied

Division 5 of the Interstate Commerce Commission has denied the application of the Benjamin Franklin Line, Inc., of San Francisco, Calif., for a certificate under the "grandfather" clause of the motor carrier act to operate as a common carrier of passengers between San Francisco and Seattle, Wash. Applicant based its right to a certificate upon an alleged operation of E. R. Parsons, whose rights it had purchased, but the commission finds that, although Parsons made arrangements for and intended to commence such a bus operation, he never in fact did so and that the Railroad Commission of California had denied him a motor carrier transportation ticket agent's license.

Disastrous Collision in China

Press dispatches of October 25 report a collision on the Canton-Hankow Railway, in which 60 soldiers were killed. The troops were being returned from South China, whither they had been sent recently on the occasion of threatened disturbances in that region. The collision was reported from Tengchatang, Hunan Province.

It appears that the leading one of two trains found it necessary on a steep ascent to set off four cars, and these four cars escaped control and ran back into the head of the following train or section. The dispatch says that an officer of the army had, at the point of a pistol, forced the men in charge of the train to act contrary to their own judgment.

National Railway Historical Society

The annual convention of the National Railway Historical Society, held in Philadelphia, Pa., on October 18, was attended by 75 delegates from chapters located in New York, Trenton, N. J., Lancaster, Pa., Baltimore, Md., and Philadelphia. L. R. Franks of Lancaster was elected chair-

Continued on next left-hand page

IT PAYS

HANDSOMELY

Forward-looking railroad men regard the modern locomotive from the broad viewpoint of ability to produce more and lower cost transportation.

Without increasing the weight on drivers, modern power is capable of delivering at least 25 to 30% greater horse power capacity compared with locomotives ten years old or over.

After all proper charges including amortization have been made, modern power will yield a handsome profit because it moves trains faster and at less cost.

LIMA LOCOMOTIVE WORKS INCORPORATED

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man for the coming year. Other officers chosen are: President, Charles A. Pittman of Philadelphia; first vice-president, Hansell Lewis of Philadelphia; second vice-president, E. G. Hooper of Baltimore; secretary, S. P. Worthington of Lansdale, Pa.; treasurer, C. Edward Lewis of Downingtown, Pa.; editor of "Bulletin," R. H. Steinmetz of Harrisburg, Pa.

The next national meeting of the society will be held in Baltimore in February, 1937.

Florida East Coast Winter Trains to Be Launched Earlier

Anticipating heavier travel to Florida this winter, the Florida East Coast is planning more comprehensive service than ever before as well as the inaugurations of its fast winter trains much earlier than last season. "There is every indication," stated J. D. Rahner, general passenger agent of the F. E. C. "that travel to the East coast of Florida will show substantial increases this winter. We also anticipate that because of the present national trend of travel back to the railroads, a greater proportion of this movement to Florida will be by train."

Virtually all winter services over the Florida East Coast will begin December 11 when the road will place in operation six trains each way between Jacksonville and Miami, two of which will be on a fast 7½ hr. schedule between these points. On January 3, the "Florida Special" will be added, making a fleet of seven trains each way, three of which will make the run between Jacksonville and Miami in 7½ hrs.

Automobile-at-Destination Plan of New York Central

The New York Central has recently installed at 28 cities along its lines a "Drive Yourself Service" whereby passengers upon leaving trains may conveniently hire automobiles and drive them themselves. The announcement states that the railroad is offering the new co-ordinated service "in co-operation with trustworthy companies at principal points on the System." The plan, coupled with reduced rail and Pullman fares, is expected to make it "more than even a matter of economy, safety, speed and convenience" to travel by rail.

The announcement points out that arrangements for an automobile may be made by applying, upon arrival, to the ticket agent at any of the cities where the service is available.

Conciliation Board for Canada Wage Case

On request of the Canadian railways and the railway unions, respectively, Hon. J. G. Gardiner, acting Minister of Labor of Canada, has appointed two members to a board of conciliation which will investigate the 10 per cent wage restoration dispute involving approximately 100,000 workers.

The acting Minister last week announced that W. Sanford Evans, of Winnipeg, had been appointed on recommendation of the railways, and Fred Bancroft, Oakville, Ont., on that of the employees.

Under the Industrial Disputes Investigation Act the next step will be for Mr. Evans and Mr. Bancroft to confer with a view to making a joint recommendation for chairman of the board. If they agree on a man he will probably be appointed by the Minister. Failing agreement, the Minister will make the appointment himself. There has not yet been an agreement on a chairman.

The difference arose when employees of the Canadian National and Canadian Pacific asked for a discontinuance of the 10 per cent deduction from basic rates of pay which has been effective for some time. The request was refused, and employees thereupon applied to the Minister of Labor for appointment of a conciliation board.

Steam Railway Accident Statistics

The Interstate Commerce Commission's completed statistics of steam railway accidents for the month of July, 1936, now in preparation for the printer, will show:

Item	Month of July 1936	Month of July 1935	7 months ended with July 1936	7 months ended with July 1935
Number of train accidents	653	494	4,869	3,726
Number of casualties in train, train-service and nontrain accidents:				
Trespassers:				
Killed	311	328	1,529	1,532
Injured	323	368	1,597	1,800
Passengers on trains:				
(a) In train accidents:*				
Killed	1	..	6	..
Injured	82	46	487	298
(b) In train-service accidents:				
Killed	1	3	3	12
Injured	174	121	990	824
Travelers not on trains:				
Killed	3	1	11	6
Injured	62	42	452	353
Employees on duty:				
Killed	68	33	373	312
Injured	1,923	1,391	12,287	9,145
All other nontrespassers:†				
Killed	170	138	997	911
Injured	474	371	3,664	3,290
Total—All classes of persons:				
Killed	554	503	2,919	2,773
Injured	3,038	2,339	19,477	15,710

* Train accidents are distinguished from train-service accidents by the fact that the former cause damage of more than $150 to railway property.

† Casualties to "Other nontrespassers" happen chiefly at highway grade crossings. Total highway grade-crossing casualties *for all classes of persons, including both trespassers and nontrespassers*, were as follows:

Number of accidents	281	214	2,210	2,043
Persons:				
Killed	151	123	909	853
Injured	305	284	2,575	2,449

Todd Heads Railway Magazine Editors Association

Stanley W. Todd, editor of the Express Messenger of the Railway Express Agency, was elected president of the American Railway Magazine Editors Association at that organization's fall convention held in Washington, D. C., on October 23 and 24. Other officers elected are: First vice-president, D. F. Brittle, Chesapeake & Ohio; second vice-president, W. A. Crawford, Central of Georgia; secretary and treasurer, M. W. Jones, Baltimore & Ohio. Editors representing magazines with a gross monthly circulation of more than half a million copies attended the convention, the program of which included discussions of their common problems in preparing employee publications.

Speakers at the meeting included Col. Robert S. Henry, assistant to the president, Association of American Railroads; J. G. Lyne, public relations editor of *Railway Age*; Floyd E. Chabot, assistant editor, Norfolk & Western Magazine; and Walter A. Johnson, editor, M-K-T Magazine, whose address was read in his absence by Walton Wentz of the Pennsylvania. At the editors' annual dinner J. M. Symes, vice-president, Operations and Maintenance Department, A.A.R., acted as toastmaster, and Sir Wilmott Lewis, Washington correspondent of the Times (London), was the guest speaker.

Railroads Labor to Press for Six-Hour Day

Legislation for a six-hour day for railroad employees without reduction in pay as compared with earnings on the present basis will be made the paramount issue to be pressed at the coming session of Congress by the railroad labor organizations, according to an announcement by George M. Harrison, chairman of the Railway Labor Executives' Association, who apparently believes that the way to increase employment is to make it more expensive. Bills will be introduced shortly after Congress convenes in January, he said. Similar bills were introduced in the last Congress but expired without action, although they were made the subject of extensive hearings before the Senate committee on interstate commerce.

"If unemployment is ever going to be solved," Mr. Harrison said, "working hours will have to be shortened. The six-hour day with no reduction in earnings is the only answer to this problem. Employment is lagging far behind the revival of railroad business." He was also quoted as saying that car loadings and profits have reached a higher peak than at any time for the last six years but that railroad employment is only slightly higher than it was in 1930, although the statistics show that the number of employees, carloadings, and net railway operating income are all still considerably below the 1930 figures.

Freight Wreck at Menlo Park, New Jersey

On the Pennsylvania, New York division, four-track, near Menlo Park, N. J., 25 miles from New York, on Monday, October 27, about 1:45 p.m., the derailment of a westbound freight train caused the death of the engineman of an eastbound train, which ran into the wreckage, and the injury of three other trainmen, and blocked the four tracks of the main line for about seven hours. It was necessary to detour eastbound passenger trains from Monmouth Junction, by way of South Amboy and Rahway, and westbound trains from West Newark over the Lehigh Valley and the Reading to near Philadelphia. Local passengers were carried between Rahway and New Brunswick, 12 miles, by buses.

The locomotive of the eastbound train was overturned, and about 20 cars were wrecked and piled up. A car of benzine was ruptured and the fluid spread over the ground, but nothing took fire.

The westbound train consisted of 125 empty cars and the eastbound of 86 loaded cars; both trains were drawn by steam locomotives. The initial derailment was at the ninth car of the westbound train,

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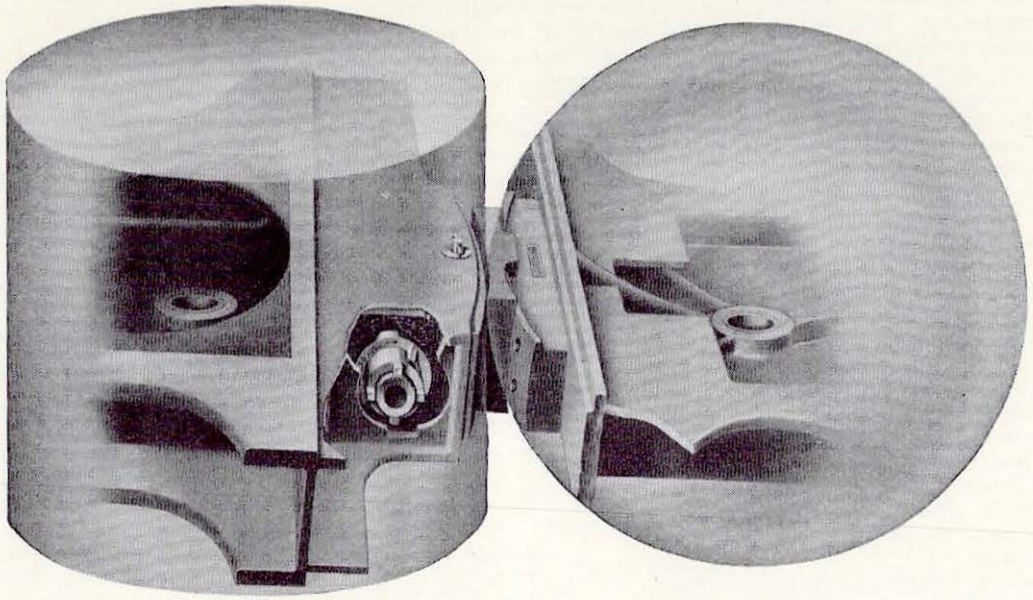
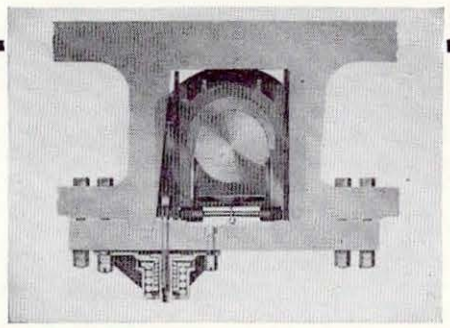


RADIAL BUFFER TYPE E-2

The Type E-2 Radial Buffer and Unit Safety Drawbar couple the engine and tender as a unit yet permit unrestricted movement between them.

With the Type E-2 Radial Buffer the radial surfaces are always under pressure contact yet cannot bind. There is no possibility of slack that causes destructive shocks on drawbar and pins. Engine and tender have unrestricted vertical, horizontal and rolling movement but this movement is dampened and engine-tender oscillation eliminated.

The Franklin Type E-2 Radial Buffer increases the safety of engine connections and vastly improves the riding of the locomotive.



FRANKLIN AUTOMATIC COMPENSATOR AND SNUBBER

Its twin, the Franklin Automatic Compensator and Snubber, maintains accurate driving box adjustment and likewise improves the riding of the locomotive and reduces locomotive and track maintenance costs.

When maintenance is required a replacement part assumes importance equal to that of the device itself and should be purchased with equal care. Use only genuine Franklin repair parts in Franklin equipment.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK CHICAGO MONTREAL

and was due to a low coupler allowing the cars to separate. The trains were on the inner tracks of the four-track line and one or more cars of the westbound must have fallen in the path of the eastbound train.

New Equipment

More new freight cars were placed in service in the first nine months of this year by Class I railroads of the United States than in any other corresponding period since 1930, the Association of American Railroads announces. The total was 27,178, compared with 3,172 cars installed in the same period of 1935, and 19,109 cars in the same period of 1934. New freight cars placed in service in the first nine months this year included the following: Coal cars, 12,007; box cars, 11,908, of which 8,893 were plain and 3,015 were automobile cars; refrigerator cars, 2,181, and 1,082 other freight cars of miscellaneous kinds.

New freight cars totaling 70,083 were placed in service in the first nine months of 1930.

New locomotives placed in service in the first nine months this year included 59 steam and 21 electric and Diesel engines compared with 28 steam and 101 electric locomotives installed in service in the same period of 1935, and 14 steam and 12 electric locomotives installed in service in the first nine months of 1934. In the corresponding period of 1930, 632 locomotives were placed in service.

Class I railroads had 19,337 new freight cars on order on October 1, this year, compared with 7,441 cars on October 1, 1935 and 5,495 cars on October 1, 1934. New locomotives on order on October 1, this year, included 50 steam and 16 electric and Diesel engines, compared with 14 steam locomotives and three electrics on order on October 1, 1935, and 37 steam and 104 electric locomotives on order on October 1, 1934.

Agriculture Vital to Railroad Success

The importance of agriculture in the successful operation of the railroads was discussed by Samuel T. Bledsoe, president of the Atchison, Topeka & Santa Fe, before the Agricultural Club at Chicago on October 22. On the Santa Fe, he said, a total of 32 per cent of the tonnage transported is products of agriculture, while because of long hauls the revenue is 42 per cent of the total. Because of the nature of the products of agriculture, certain types of cars, involving large investments, are required. Mr. Bledsoe also showed how the business of the railroads is reflected in employment and purchasing, the resulting effect being felt down to the stores of the smallest merchants in the land.

In discussing railroads and the depression, he said, "I assert with confidence that, notwithstanding the disastrous effects of the depression upon railway revenues, the railroads have not failed in their public duty as transportation agencies, for during that period the service has been more efficient, more dependable, more comfortable and more expeditious than prior to the depression. Traffic increases, born of revival in general business, would increase both gross and net returns to the railroads. The vicious cycle would disappear and automatically there would be corresponding increases in the number of employees, in the aggregate amount which railroads could disburse in wages and in the amount they would spend for fuel, material and supplies; for equipment and other capital purposes; all adding materially to the prosperity of industry generally."

A.S.M.E. Annual Meeting

A minimum of simultaneous technical sessions have been arranged for this year's annual meeting of the American Society of Mechanical Engineers to be held at the Engineering Societies building, New York, November 30 to December 4, inclusive. Recourse is being had to two evening sessions, Monday, November 30, and Thursday, December 3, and to an increased number of gatherings, some combined with luncheons, at which the panel method will permit discussion of present trends and topics of interest in general and special fields. Among the discussions planned, to be conducted by the panel method, will be one Wednesday afternoon, December 2, in honor of George Westinghouse, at which former associates will discuss his engineering achievements. The annual dinner will be held on Wednesday evening, December 2.

The program in part is as follows:

TUESDAY, DECEMBER 1
2 p.m.
Railroads

The Use of Alloy Steels for Side Frame and Bolsters of Freight-Car Trucks, by D. S. Barrows
Report on Railroad Aerodynamics Subcommittee of Aeronautic Division (to be presented by title)
Progress Report of Railroad Mechanical Engineering

4:30 p.m.
Westinghouse Ninetieth Anniversary
8 p.m.
Honors Night
Towne Lecture, by Dr. James Rowland Angell, president of Yale University

WEDNESDAY, DECEMBER 2
9:30 a.m.
Cutting Metals

Cemented Carbide Tool Maintenance and Application, by L. J. St. Clair

2 p.m.
Machinery and Springs

Discussions of Spring Problems To Include Rubber Springs, Helical Springs and Spring Materials
Bearing Oil-Ring Performance, by R. Baudry and L. M. Tichvinsky
Quieting Machinery, with demonstrations by E. J. Abbott

6:30 p.m.
Annual dinner and Thurston lecture, Astor Hotel

THURSDAY, DECEMBER 3
9:30 a.m.
Management
(Jointly with Society for Advancement of Management and Personnel Research Federation)

Dealing with Workers Today
Modern Principles and Practice of Manufacturing Organizations in Employee-Employer Relationship, by W. G. Marshall, T. I. Phillips, J. H. Priest, and R. M. Rumbel—Representatives of the Westinghouse Electric & Manufacturing Company

Corrosion-Resisting Metals
Symposium I

Introduction to Corrosion Resistant Metals, by F. H. Speller
Aluminum and Its Alloys, by E. H. Dix, Jr., and R. B. Mears
Construction and Use of Lead Equipment, by G. O. Hiers

2 p.m.
Corrosion-Resisting Metals
Symposium II

Zinc in the Chemical Industries, by E. A. Anderson
Cast Iron, by Dr. H. L. Maxwell
Copper and Copper-base Alloys, by R. A. Wilkins

Management

Training to be Skilled Workers
Symposium sponsored by Management Division, Committee on Education and Training, Society for Advancement of Management and Personnel Research Federation
F. E. Searle, superintendent, Ford Motor Car Company schools, will discuss the selection of apprentices and their training to operate machines
Chas. G. Simpson, Philadelphia Gas Works, will discuss adult education

8 p.m.
Corrosion-Resisting Metals
Symposium III

Corrosion-Resistant Steel, by J. H. Critchett
Nickel and Nickel-Base Alloys, by F. L. LaQue

Bridge and Building Supply Men's Exhibit

Forty manufacturers of materials and equipment used in the construction and maintenance of bridges, buildings and water service facilities, presented exhibits under the auspices of the Bridge and Building Supply Men's Association, at the forty-third annual convention of the American Railway Bridge and Building Association at the Stevens hotel, Chicago, on October 20-22.

The officers who served this association during the past year were John W. Shoop, manager railway sales, The Lehon Company, Chicago, president; L. F. Flanagan, Detroit Graphite Company, Chicago, vice-president; W. S. Carlisle, National Lead Company, Chicago, secretary; D. A. Hultgren, Massey Concrete Products Corporation, Chicago, treasurer. The members of the executive committee were: C. H. Johnson, Fairmont Railway Motors, Inc., Fairmont, Minn.; A. J. Filkins, Paul Dickinson, Inc., Chicago; George R. McVay, The Ruberoid Company, Chicago; K. T. Batchelder, The Insulite Company, Chicago; Guy C. Mills, Zitterell-Mills Company, Webster City, Iowa; and Earle A. Mann, Modern Supply Company, Chicago.

At the annual meeting held on October 22, Mr. Flanagan was elected president; C. E. Ward, U. S. Wind Engine & Pump Co., Batavia, Ill., was elected vice-president; while Mr. Carlisle was re-elected secretary and Mr. Batchelder was elected treasurer. G. W. Morrow, Ingersoll-Rand Company, Chicago, was elected a member of the executive committee to fill out Mr. Batchelder's unexpired term. Earl E. Thulin, Duff-Norton Manufacturing Company, Chicago, and C. C. Rausch, Dearborn Chemical Company, Chicago, were elected members of this committee for three years, succeeding Messrs. Johnson and Filkins, whose terms expired this year.

The companies participating in this exhibit, their products and their representatives follow:

Air Reduction Sales Corporation, New York; welding and cutting equipment and accessories, samples of welded pipe, carbide lamps, compressed air and nitrogen for operating pneumatic tools, sealed pipe joints, calcyanide; C. B. Armstrong, C. A. Daley, J. W. Kenefic, R. T. Peabody, E. F. Portell and E. F. Turner.

Armstrong Paint & Varnish Works, Chicago; brine-dripping paint, bridge paint and general maintenance paints; L. D. Mitchell and Tom Wyles.

Arrow Tools, Inc., Chicago; rivet-cutting safety retainers, riveting hammers, forged hand tools; W. S. Holmes and H. J. Trueblood.

Automatic Nut Company, Chicago; lock nuts, structural ribbed bolts; A. B. Cross and R. J. Voss.

The Barrett Company, New York; roofing specialties, acid resisting paints, roofing cements, roofing materials, tar emulsions, wood preservatives; W. P. Hickman and L. L. Thoms.

Binks Manufacturing Company, Chicago; paint spraying equipment; R. E. Mann and E. F. Watts.

A. M. Byers Company, Pittsburgh, Pa.; model of bridge with wrought iron floor, blast plates, railing and bearing plates—literature on wrought iron; E. S. McCormick and W. J. Wignall.

Celotex Company, Chicago; insulation, wallboard, and cold storage insulation; H. A. Winandy and C. R. Young.

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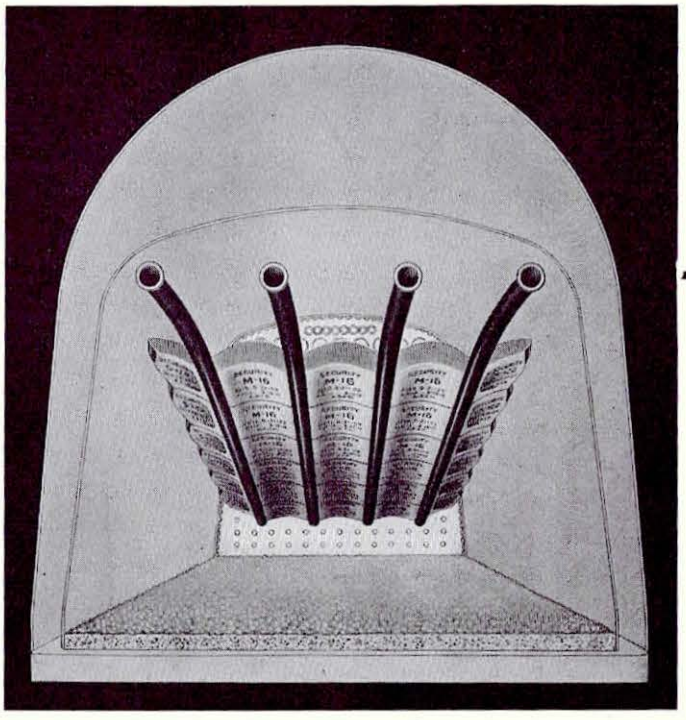
FIREBOX DESIGNS HAVE IMPROVED!

Since the Security Sectional Arch was introduced firebox designs have improved both in efficiency and capacity.

In this progress American Arch Company engineers have had a leading part.

While basically unchanged, the development of the Security Sectional Arch has paralleled firebox development.

With this broad background of experience plus constant research and development in refractories, the engineers of the American Arch Company have available to the railroads of this country specialized knowledge in economical combustion that is nowhere else available.



There's More to SECURITY ARCHES Than Just Brick

HARBISON-WALKER REFRACTORIES CO.

Refractory Specialists

AMERICAN ARCH CO.
INCORPORATED

Locomotive Combustion Specialists » » »

Dearborn Chemical Company, Chicago; rust preventives, sealing compound for wood water tanks, aluminum protective coating for steel, pipe covering for underground pipes; J. A. Creuner, H. C. Moeller and C. C. Rausch.

Detroit Graphite Company, Detroit, Mich.; bridge paints, building paints; L. F. Flanagan and E. C. Roberts.

Paul Dickinson, Inc., Chicago; roof ventilators, smoke jacks, stove jacks, roof drains, exhaust heads; Paul Christianson, A. J. Filkins and Stanley Weeks.

Joseph Dixon Crucible Company, Jersey City, N. J.; graphite paints, aluminum paints, waterproof grease for cables, and cup grease for turntables; E. C. Bleam.

The Duff-Norton Manufacturing Company, Pittsburgh, Pa.; automatic lowering and ball-bearing jacks, special jack for pulling drift bolts; C. N. Thulin and E. E. Thulin.

Fairmont Railway Motors, Inc., Fairmont, Minn.; literature on motor cars and paint spray car; C. P. Benning, Kenneth Cavins, C. J. Dammann and J. E. Simkins.

B. E. Hurlbut, Chicago; self-priming centrifugal pumps, paint-spray equipment, power timber saws, portable a.c. electric power plants; J. C. Gorman, B. E. Hurlbut and H. F. Willson.

Ingersoll-Rand Company, New York; literature on pneumatic tools, jackhammers, compressors and pumps; G. W. Morrow and D. W. Zimmerman.

Ingot Iron Railway Products Company, Middletown, Ohio; model of perforated pipe for bridge deck drainage, bonded metal, metal cribbing and literature on spiral welded pipe; E. T. Cross and W. P. Greenawalt.

The Insulite Company, Minneapolis, Minn.; building insulation, model of cold storage insulation, combination insulation and building sheathing; K. T. Batchelder and C. S. Johnston.

Johns-Manville Sales Corporation, New York; transite pipe, refractories, pipe insulation, asbestos wainscoting and wallboard, mechanical packing; asphalt plank; T. O'Leary, Jr., H. R. Poulson and L. T. Wouhn.

Koppers Company (Tar and Chemical Division), Pittsburgh, Pa.; roofing, waterproofing materials, road tar, creosote, other tar products; H. L. Stockdale.

The Lehon Company, Chicago; asphalt shingles, asbestos shingles, prepared and built up roofing, aluminum roofing paint, waterproofing materials; John Eipper, Tom Lehon, R. J. Mulroney, John W. Shoop and Harry Wolfe.

Mall Tool Company, Chicago; gas and electric driven machines for vibrating and surfacing concrete with attachments for pumping water, drilling, boring, driving lag screws, wire scratch brushing and sanding; A. W. Mall, F. A. McGonigle and F. G. Meier.

Massey Concrete Products Corporation, Chicago; literature on and photographs of concrete pipe, concrete cribbing and crossing slabs; Ross Clarke and David A. Hultgren.

Master Builders Company, Cleveland, Ohio; samples of floor wearing surfaces, rust-joint iron, non-shrink aggregate for concrete bonds, reground portland cement paint for concrete surfaces, liquid quick-setting compound; E. L. McFalls, James Stone and B. R. Wood.

Modern Supply Company, Chicago; samples of rebuilt pneumatic tools with hard chrome bridge reamers and small bridge tools; C. W. Cregier, Earle A. Mann, H. J. Schumacher and A. A. Walker.

Morrison Railway Supply Corporation, Buffalo, N. Y.; samples of structural welding, ties and poles treated with Osmose, model of trestle treated with plastic preservative, literature on welding frogs and crossings; George W. B. Diver, Frank Mooney, Marion Morrison and Raymond L. Morrison.

National Aluminate Corporation, Chicago; H. H. Richardson.

National Lead Company, New York; red lead, white lead, expansion bolts; J. O. W. Belt, W. S. Carlisle, F. M. Hartley, Jr., and O. Meyer.

Otley Paint Manufacturing Company, Chicago; pigments, paint panels, bridge and building paints, paint vehicles; Walter A. Otley, E. V. Van Patten.

W. W. Patterson Company, Pittsburgh, Pa.; wood and steel tackle blocks; W. W. Patterson, Jr.

Pittsburgh Plate Glass Company (Paint and Varnish Division), Newark, N. J.; paints and waterproofing; W. T. Carey, C. S. Gush, J. G. Mowry and L. F. Theurer.

Pocket List of Railroad Officials, New York; copies of publication; B. J. Wilson.

Railway Age, Chicago; copies of *Railway Age* and Railway Engineering and Maintenance; George E. Boyd, M. H. Dick, Elmer T. Howson, W. S. Lacher and H. A. Morrison.

The Ruberoid Company (Railroad Division), Chicago; mineral wool insulation, pipe covering, asbestos shingles, roofing and siding, magnesia insulation, asphalt shingles, prepared roofing; G. R. McVay.

Teleweld, Inc., Chicago; model of welded through-girder span, adjustable eye-bar; C. W. McKee, J. A. Roche and R. R. Swanson.

Thompson & Company, Oakmont, Pa.; metal paints and rust inhibitor, model of steel truss; C. L. Boyle, J. L. Crowley, T. C. McKenzie, D. D. Monroe and J. V. Thompson.

United States Gypsum Company, Chicago; interior and masonry paints, asphalt roofing, gypsum and steel decks, asbestos products, board and mineral wool insulation, expanded metal and metal lathe products, lime, gypsum wallboard, fibre wall board, lime products, plaster products; W. J. Berry and John C. Stewart.

U. S. Wind Engine & Pump Company, Batavia, Ill.; valves, water-column parts, water-service equipment, literature; J. P. Prindle and C. E. Ward.

Yale & Towne Manufacturing Company (Chain Hoist Division), Philadelphia, Pa.; pulling and lifting hoists; R. J. Archart and R. H. Irwin.

Zitterell-Mills Company, Webster City, Iowa; model of enginehouse; Guy C. Mills.

New Haven Authorized to Abandon Automatic Train Stops

The Interstate Commerce Commission, in a report dated October 19, has granted the petition of the trustees of the New York, New Haven & Hartford for authority to use, on those portions of the road where automatic train control is in operation, four-indication cab signals exclusively, discontinuing the brake-setting apparatus. A public hearing was held at New Haven but there was no opposition to the road's petition.

The lines involved are double-track between New Haven, Conn., and Springfield, Mass., 58 miles, and the line, partly two-track and partly four-track, between New Haven and Providence, R. I., 105 miles (243 miles of track). With the change in operation there will be a second cab signal (on the fireman's side) and the whistle signal, giving an adverse indication, will be operated so as to continue to sound until acknowledged.

At the hearing, testimony was taken from operating officers and locomotive enginemen to the effect that operation would be safer without the brake-setting apparatus than with it; this because of possible damage from undesired applications of the brakes. Lunar-white lights in the cab, giving the most restrictive indication, are controlled on the Springfield line by the track-circuits of both the approach block and the occupied block, whereas on the Providence line the control is only by the occupied block; but the signal engineer testified that this lack of uniformity involved no element of uncertainty or doubt.

Specifying detailed reasons for desiring the change, officers of the road testified that 10 locomotives now under construction could be built for $6,000 less if the brake applying apparatus is not applied, and that there will be an estimated saving of $9,450 when there is no expense for maintenance of the brake-setting apparatus. Also, it was stated that if the cab signals and wayside signals on the Springfield line were to be changed, so as to be uniform with the Providence line, an expenditure of $263,260 would be involved; and, if the brake-setting apparatus were to be continued, it would be necessary to spend $6,354 to put the resetting devices where their use would not involve hazard to men getting off to operate them in dangerous locations.

Testifying as to the adequacy of the signaling on the Springfield line, without making changes to make this line uniform with the other, an officer testified that in a great many cases a train runs over the whole of this division, 62 miles, without once encountering either a caution or a stop signal.

In issuing the order, complying with the road's request, the Commission adds the usual government specifications for cab signals.

Equipment and Supplies

LOCOMOTIVES

THE WESTERN PACIFIC is expected to enter the market for 10 locomotives.

THE DENVER & RIO GRANDE WESTERN is inquiring for 15 locomotives—5 of the 4-8-4 type and 10 of the 4-6-6-4 type.

THE KANSAS CITY SOUTHERN has ordered ten 2-10-4 type locomotives from the Lima Locomotive Works. Inquiry for this equipment was reported in the *Railway Age* of September 12. The locomotives will have a steam pressure of 310 lb., 70 in. driving wheels and a tractive force of 93,000 lb.

CHICAGO, BURLINGTON & QUINCY.—Directors of this road have approved the expenditure of $8,000,000 for five 4-8-4 type locomotives and 3,250 freight cars. Of the total, 1,750 will be either hopper or composite coal cars, 1,000 will be box cars, 250 automobile cars, 100 flat cars and 150 stock cars.

FREIGHT CARS

THE LOUISIANA & ARKANSAS is considering the purchase of 80 hopper cars.

THE LOUISVILLE & NASHVILLE is considering repairing 300 to 400 freight cars. An inquiry has been issued for 2,000 tons of car material.

THE KANSAS CITY SOUTHERN has ordered 900 freight cars—500 box cars from the Pullman-Standard Car Manufacturing Company, 300 box cars from the General American Transportation Corporation and 100 gondola cars from the Mt. Vernon Car Manufacturing Company. Inquiry for this equipment was reported in the *Railway Age* of September 12.

PASSENGER CARS

THE KANSAS CITY SOUTHERN has ordered four light-weight, air-conditioned passenger coaches, and one combination dining and chair car, from the Pullman-Standard Car Manufacturing Company.

IRON & STEEL

THE CHICAGO & NORTH WESTERN is inquiring for 48,500 tons of rails.

THE KANSAS CITY SOUTHERN is asking for bids on 8,000 tons of 127-lb. rail for 1937 delivery.

THE WESTERN MARYLAND has placed orders for 3,500 tons of rail for early November delivery.

THE RICHMOND, FREDERICKSBURG & POTOMAC has ordered 1,575 tons of 131-lb. RE rail from the Bethlehem Steel Company.

THE NEW YORK CENTRAL has received bids on about 170 tons of steel for grade crossing elimination work at Montrose, N. Y.

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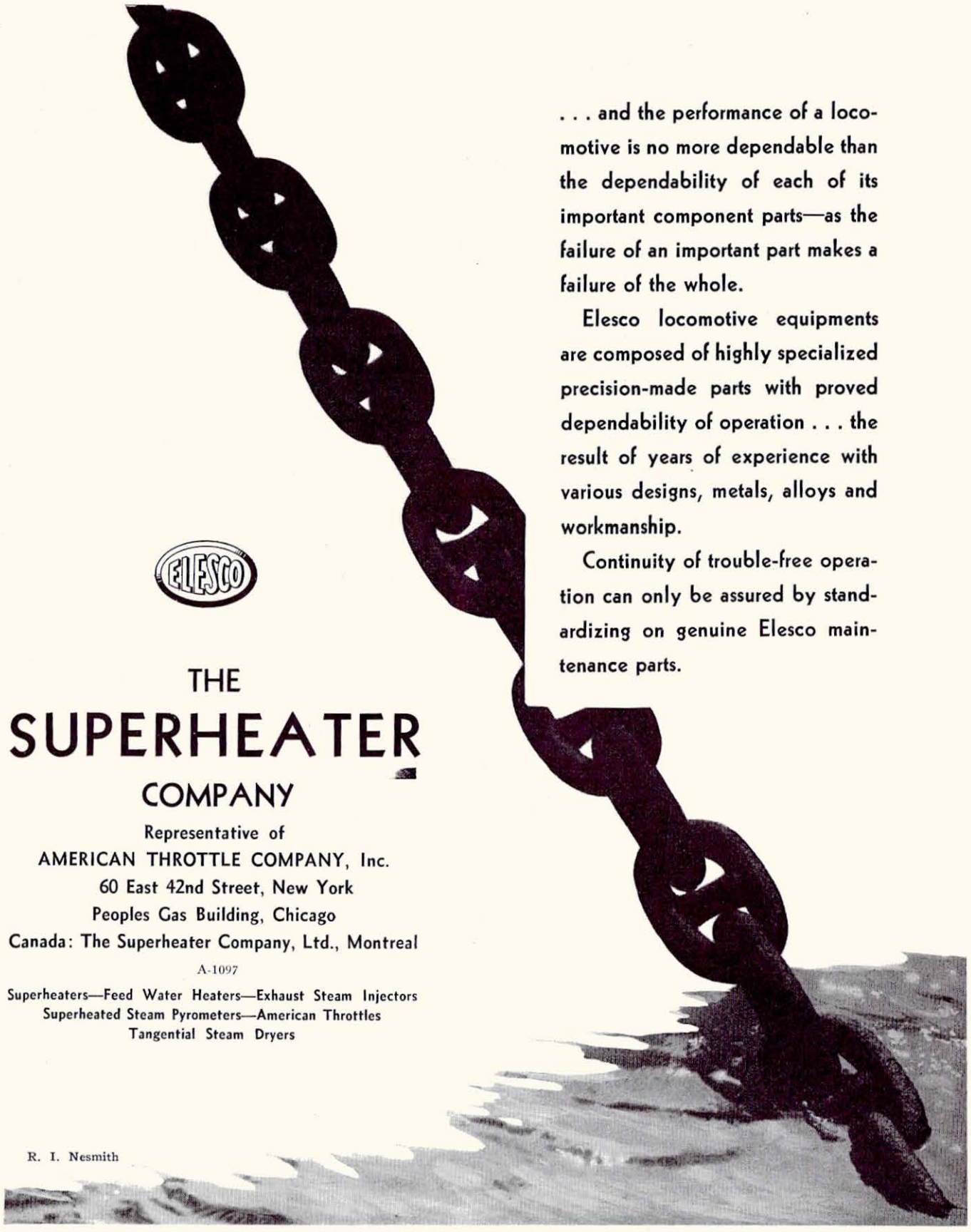
A CHAIN IS AS STRONG AS ITS WEAKEST LINK



. . . and the performance of a locomotive is no more dependable than the dependability of each of its important component parts—as the failure of an important part makes a failure of the whole.

Elesco locomotive equipments are composed of highly specialized precision-made parts with proved dependability of operation . . . the result of years of experience with various designs, metals, alloys and workmanship.

Continuity of trouble-free operation can only be assured by standardizing on genuine Elesco maintenance parts.

ELESCO

THE SUPERHEATER COMPANY

Representative of
AMERICAN THROTTLE COMPANY, Inc.
60 East 42nd Street, New York
Peoples Gas Building, Chicago
Canada: The Superheater Company, Ltd., Montreal

A-1097

Superheaters—Feed Water Heaters—Exhaust Steam Injectors
Superheated Steam Pyrometers—American Throttles
Tangential Steam Dryers

R. I. Nesmith

Supply Trade

John W. White, managing director, Compania Westinghouse Electric Internacional, S. A., Buenos Aires, Argentina, has been appointed general manager of the **Westinghouse Electric International Company.** Mr. White will have his headquarters in New York City.

C. J. Fechheimer has joined the engineering staff of the **Louis Allis Company,** Milwaukee, Wis., manufacturers of electric motors, in the capacity of consulting engineer. Mr. Fechheimer has been associated with the electrical manufacturing industry, as designing engineer, and research engineer, for over 20 years.

Lester A. Crone, vice-president of the **Buffalo Brake Beam Company,** has been elected president, with headquarters at New York and Buffalo, N. Y., to succeed Seth A. Crone, deceased. **Alfred F. Crone,** assistant to president, has been elected vice-president, with headquarters at Buffalo.

J. S. Allison, Jr., has been appointed Chicago district manager of the **Babcock & Wilcox Company's** refractories sales department, with office at 140 South Dearborn street, Chicago. He will be assisted by H. J. Shaner and R. M. Onan, who have been handling the sale of refractories in the Chicago district for several years. Mr. Allison was formerly manager of the high temperature insulation department, building products division, of Armstrong Cork Products Company.

Lee M. Hogan, former manager of advertising and sales promotion in the sales department of **Steel & Tubes, Inc.,** a subsidiary of **Republic Steel Corp.,** Cleveland, Ohio, has been appointed district sales manager of the New York district. **Irving Whitehouse,** former assistant manager, has been appointed manager of sales promotion. **A. R. Smith,** superintendent of the Elyria division of Steel & Tubes, has been promoted to general manager of that division upon the retirement of **A. E. Adams.**

Frank H. Prescott, general manager of **Delco Products Corporation,** division of **General Motors Corporation,** with headquarters at Dayton, Ohio, has been elected vice-president and general manager of the **Electro-Motive Corporation,** La Grange, Ill. This will permit **H. L. Hamilton,** president and general manager, to devote more time to general administration.

C. D. Allen has been appointed representative of the **J. S. Coffin, Jr., Company,** Englewood, N. J. Mr. Allen was born on August 5, 1887, at Mount Holly, Vt., and received his education at the Rochester High School, Mount Hermon Preparatory School and Toronto Technical School. In 1906 he entered the employ of the Central Vermont and in 1910 became locomotive engineman at St. Albans, Vt. He became a locomotive engineman on the Canadian National in June, 1914, and later served as locomotive foreman. In 1920 he became railway sales and service manager of T. McAvity & Sons of Canada, and from April, 1927, until 1936 was, consecutively, salesman, service engineer and development engineer of Manning, Maxwell & Moore, Inc.

S. R. Thomas, chief engineer of the Auburn, Cord and Dusenberg automobiles for the Cord interests, has been appointed manager of the automotive bearing division of the **Bantam Ball Bearing Company,** South Bend, Ind. Previous to his connection with the Cord interests, he was employed in the engineering department of the General Motors Corporation. He has spent 22 years in direct contact with the automotive industry.

S. R. Thomas

OBITUARY

William T. Watkins, chairman of the board of the Joyce-Watkins Company, Chicago, and a pioneer producer of railway cross ties, died on October 16 at Marietta, Ohio. Mr. Watkins was born in 1860 in Chautauqua County, N. Y., and began his business career as a purchasing agent of the Minneapolis, St. Paul & Sault Ste. Marie in 1886. In 1897 he became vice-president of the Bradley-Watkins Company and later served as president of the Pillsbury-Watkins Company. In 1906, he became vice-president of the Joyce-Watkins Company, Chicago, and in 1909 he was elevated to the presidency of this company. Since 1932 he had been chairman of the board. At the time of his death he was also president of the Watkins Creosoting Company, the Arrow Transportation Company, and a director of the Wyoming Tie & Timber Company.

William T. Watkins

Clinton Jesse Axtell, assistant engineer of the Control division, Transportation Engineering department of the General Electric Company, died suddenly at his office in the Erie, Pa., works on October 16. He was born in 1883 at Axtell, Kan., and was graduated from Kansas State College in 1904 with the degree of B. S. in E. E. His work included regenerative electric braking, high-voltage direct-current systems, car lighting, and control for automotive vehicles.

Construction

CHESAPEAKE & OHIO.—Plans are under way for riprapping the embankment on the Rivanna sub-division at Scottsville, Va., Manteo, Bolling Hall and West View, to cost about $60,000. Haley, Chisholm & Morris, Charlottesville, Va., are the contractors.

NORTHERN PACIFIC.—Contracts have been awarded to Morris & Dougherty, St. Paul, Minn., for loading and distributing bank widening material on Butte mountain, between Whitehall, Mont., and Butte. These contracts involve the handling of 75,000 cu. yd. of disintegrated granite, at an estimated cost of $35,000.

RICHMOND, FREDERICKSBURG & POTOMAC.—This road has authorized additions to its Acca locomotive terminal at Richmond, Va.; the plans call for a machine and repair shop and new storehouse building with the necessary tracks; removal and reconstruction of the boiler shop and the removal and relocation of machine tools, etc. The work is being carried out by railroad company forces and will cost about $135,000.

ST. LOUIS, MO.—The city of St. Louis, through the Board of Public Service, has awarded a contract to the Fruin-Colnon Contracting Company, St. Louis, for the construction of a connection between the western railroad approach to the Municipal bridge across the Mississippi river and the Merchants Bridge Terminal elevated structure and the Missouri Pacific tracks. This work, which will involve an expenditure of $51,954, includes the construction of all foundations, superstructures and fills for the connection.

STATEN ISLAND RAPID TRANSIT RAILWAY COMPANY.—This Baltimore & Ohio subsidiary has given a contract to the Vanbro Construction Corporation, West New Brighton, Staten Island, N. Y., for the elimination of grade crossings at Lynhurst, Chestnut and Cedar avenues, Staten Island, to cost about $165,000.

WABASH.—A contract has been awarded by this company to the Ross & White Company, Chicago, for the construction in its entirety of a 200-ton fireproof, structural steel, automatic electric locomotive coaling plant for installation at Colburn, Ind.

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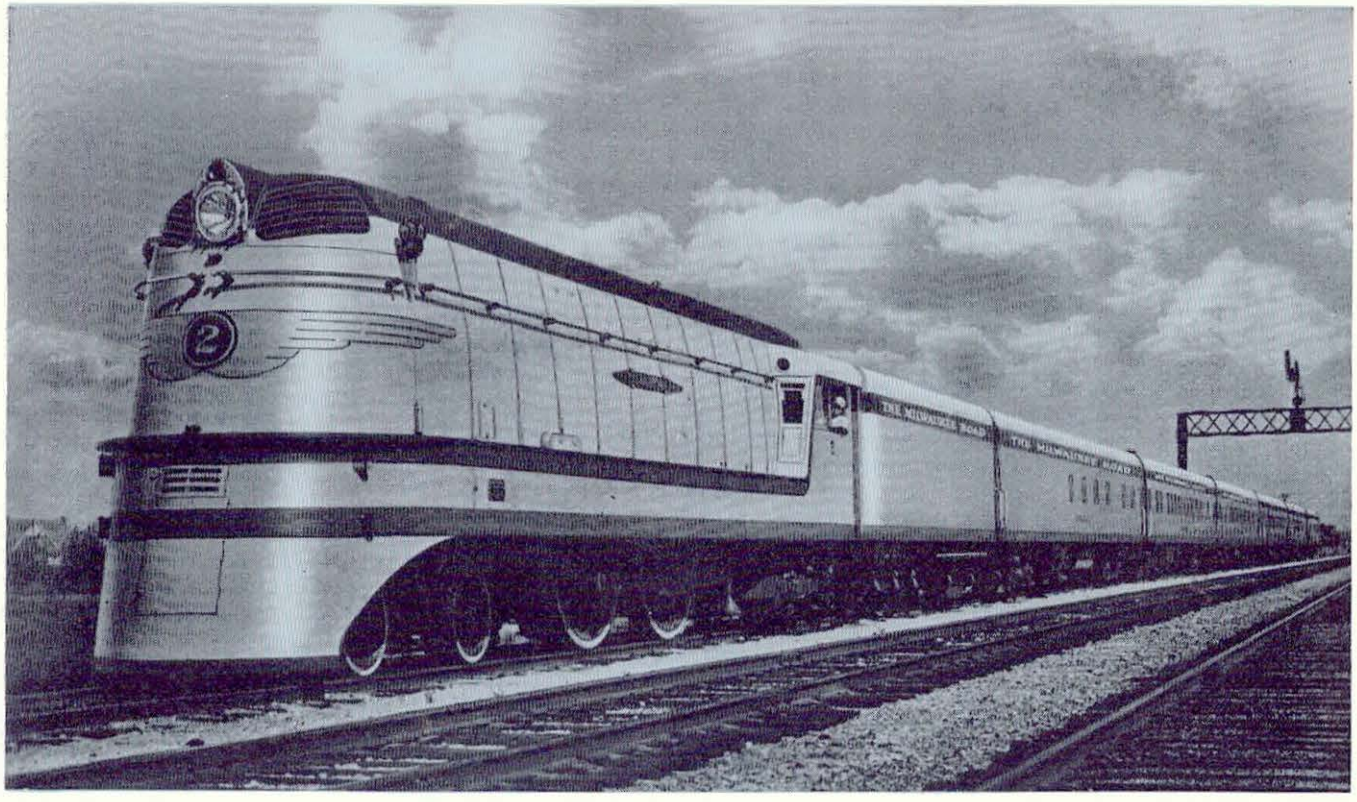

THE REIGNING QUEEN

THE "HIAWATHA" is the 6-hour 30-minute train of the Chicago, Milwaukee, St. Paul and Pacific Railroad, operating between Chicago, Milwaukee and St. Paul, a distance of 410 miles.

The locomotive was guaranteed originally for 6 cars. Later, a seventh car was added, and still later an eighth car was added and the locomotive kept right on making the same exacting schedule.

Now, after only 16 months of operation, this train has been replaced with even more luxurious equipment. The new cars have been built of lighter, high-tensile steel, and the saving in weight will allow the addition of another car. No change in the locomotive. Former schedules are maintained.

THE "HIAWATHA" OF 1937 — NINE CARS — THE REIGNING QUEEN OF ALL SPEEDLINERS.

Alco

AMERICAN LOCOMOTIVE COMPANY

30 CHURCH STREET, NEW YORK CITY

Financial

ATCHISON, TOPEKA & SANTA FE.—*Acquisition.*—This company has applied to the Interstate Commerce Commission for authority to acquire control of the Pecos & Northern Texas and the Pecos River through purchase of their stock from the Eastern of New Mexico.

BANGOR & AROOSTOOK.—*Stock.*—The Interstate Commerce Commission has authorized this company to issue 38,280 shares of cumulative convertible preferred 5 per cent stock ($100 par), the proceeds of the sale of which will be utilized to redeem at 110 outstanding 7 per cent preferred stock. The issuance of 76,560 ($50 par) common stock has also been authorized to provide for the conversion of such of the issue as may be offered for conversion. The road will pay an underwriters' fee of $70,000, plus $1.50 a share for each share of the cumulative preferred issue, not subscribed for by the stockholders and purchased by the underwriters.

BLISSFIELD.—*Abandonment.*—The Interstate Commerce Commission has authorized the abandonment as to interstate and foreign commerce of the entire line of this company extending from Riga, Mich., to Adrian, 12.5 miles.

BOSTON & MAINE.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon a branch line extending from Franklin, N. H., to Bristol, 13 miles,—the railroad agreeing to provide a substitute highway service.

CENTRAL OF NEW JERSEY.—*Acquisition.*—The Interstate Commerce Commission has authorized this company to acquire 1,123 outstanding shares of stock of the Ogden Mine R. R. at $66⅔ per share, provided the holders offer it for sale within 60 days. This railroad, under lease to the Jersey Central, has been authorized for abandonment.

CENTRAL WEST VIRGINIA & SOUTHERN.—*Abandonment.*—Division 4 of the Interstate Commerce Commission has authorized this company to abandon its entire line from Hendricks, W. Va., to Harmon, 21.1 miles. The commission in 1929 authorized the abandonment of the line from Hendricks to Armentrout, 29.5 miles, and 8.5 miles of the line was dismantled but the company has continued to operate the remainder of its line.

CHICAGO & EASTERN ILLINOIS.—*Equipment Trust.*—The Interstate Commerce Commission has authorized the trustee of this company to assume obligation for $1,080,000 of series G 3½ per cent equipment trust certificates, to be delivered to the General American Transportation Corporation at par in payment of 80 per cent of the purchase price of 500 box cars.

COLORADO & SOUTHERN.—*Abandonment of 170 Miles Authorized.*—In one of the most important abandonment cases which has come before it, the Interstate Commerce Commission after six years has authorized this company to abandon 170.22 miles of its Denver-Leadville narrow-gage line and branches in Colorado. In 1930 the commission had denied the company's application for authority to abandon the line from Waterton to Leadville, 131.67 miles, and branches making a total of 185 miles, without prejudice to its renewal after 36 months if the company could show that the situation had not materially improved. The company offered to donate the lines, or any portion of them, to any local interests or communities that might wish to operate them, and two corporations formed for the purpose filed applications with the commission for authority to acquire and operate the lines, which were denied. On August 16, 1935, the company filed a petition to re-open the case and to amend its application by excluding the request for permission to abandon the western portion of the line between Leadville and Climax, 14.83 miles. "It has been clearly demonstrated," the commission's report says, "that the line cannot be operated successfully with its present equipment" and "the record clearly shows that neither the present nor prospective volume of traffic on the line is sufficient to warrant its retention and that continued maintenance and operation thereof would impose an undue burden upon the applicant and upon interstate commerce." Commissioner Splawn dissented and Aitchison and McManamy concurred in his expression. Commissioner Eastman concurred in part but urged another six-month period to ascertain if arrangements could not be made for some measure of financial help from those whom the road serves or the state or both. Commissioner Porter, concurring in part, thought the commission should attach conditions looking to the protection of the employees.

GREAT NORTHERN.—*Truck Certificate.*—Division 5 of the Interstate Commerce Commission announced on October 23 that the report of Joint Board No. 24, issued early in September, recommending the granting of a certificate to this company authorizing operation as a common carrier of commodities generally by motor vehicle between its stations at Breckenridge, Minn., and Fargo, N. D., and the accompanying form of order, had become effective as the action of the commission on September 24. Such proposed orders become effective if no exceptions are filed within 20 days.

MINNEAPOLIS & ST. LOUIS.—The Minneapolis & St. Louis was offered for sale at public auction for the fourteenth time on October 23. No prospective purchasers appeared, and the sale was postponed.

MINNEAPOLIS & ST. LOUIS.—*Receivers' Certificates.*—The Interstate Commerce Commission has authorized the receivers' of this company to issue $1,008,000 of their certificates to renew or extend a like amount of such certificates, maturing for the most part in November.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—*Abandonment.*—The Interstate Commerce Commission has authorized abandonment by this company of a line extending from Rice Lake, Wis., to Birchwood, 16.6 miles.

MISSOURI & KANSAS.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon its entire (electric) line between the outskirts of Kansas City, Mo., and Olathe, Kan., 20 miles.

MISSOURI PACIFIC.—*Compensation of Counsel.*—The Interstate Commerce Commission has fixed at $17,524.79 the maximum compensation and expenses of E. S. Ballard as special counsel to the debtor companies in reorganization proceedings, without prejudice as to subsequent additional allowances.

MISSOURI PACIFIC TRANSPORTATION COMPANY.—*Acquisition.*—This company has applied to the Interstate Commerce Commission for authority to purchase three units of equipment and the permits of the Dardanelle Transfer Company, operating between Paris, Ark., and Dardanelle.

NEW YORK CENTRAL.—*Lease of Subsidiary.*—The Interstate Commerce Commission has authorized this company to acquire control by lease of the St. Lawrence & Adirondack, the entire stock of which it owns. The lease is also subject to approval of the Board of Railway Commissioners of Canada.

SANTA FE TRANSPORTATION COMPANY.—*Acquisition.*—Grover L. Swink, assistant chief of the section of Finance, of the Interstate Commerce Commission's Bureau of Motor Carriers, has recommended in a proposed report that the commission authorize the purchase by this company of the property and operating rights of T. R. Rex, doing business as the Rex Transfer Company, for a consideration of $55,000. The Rex company operates 20 units of automotive equipment in common carrier service in California.

SOUTHERN.—*Abandonment.*—The Interstate Commerce Commission has denied the application of this company for authority to abandon a line extending from Embreeville Junction, Tenn., to Embreeville, 13 miles.

SOUTHERN PACIFIC.—*Equipment Trust Certificates.*—Subject to approval of the Interstate Commerce Commission, this company has awarded to a syndicate headed by Halsey, Stuart & Co. an issue of $9,100,000 of 2¼ per cent equipment trust certificates, the price being 99.527. The issue has been publicly offered by the successful bidders at prices to yield from 0.5 to 2.5 per cent, depending upon maturity date.

Dividends Declared

Norfolk & Western.—$2.00, quarterly, payable December 19 to holders of record November 30.

Reading.—1st Preferred, 50c, quarterly, payable December 10 to holders of record November 19.

Average Prices of Stocks and Bonds

	Oct. 28	Last week	Last year
Average price of 20 representative railway stocks..	58.87	59.33	35.81
Average price of 20 representative railway bonds..	83.54	84.50	72.46

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Since the first installation of "Union" Centralized Traffic Control on the Pere Marquette in 1928, experience has proved this signal system to be one of the most effective for expediting service and cutting transportation costs, as witnessed by the performance of the many installations made each year ▪ ▪ ▪ There are "hot spots" on many roads that could profitably be eliminated by installation of "Union" C.T.C. Shall our nearest office assist in making recommendations?

1134

1881 **Union Switch & Signal Co.** 1936

SWISSVALE, PA.

NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO

Railway Officers

EXECUTIVE

J. N. Brand, general manager of the Atlantic Coast Line, with headquarters at Wilmington, N. C., has been appointed assistant vice-president.

George S. Lee, who retired on September 30 from the position of vice-president in charge of traffic for the Railway Express Agency, was born on September 5, 1866. In the *Railway Age* of October 10, when Mr. Lee's retirement was announced, the year of his birth was erroneously stated to be 1886.

TRAFFIC

W. Wallace Woolford, chief clerk to the general passenger agent of the Gulf, Colorado & Santa Fe, has been appointed assistant general passenger agent, with headquarters as before at Galveston, Tex., to succeed **R. L. Wheat,** who has been transferred because of illness.

Elmer A. Schier, whose appointment as general traffic manager of the Pittsburgh & West Virginia, with headquarters at Pittsburgh, Pa., was noted in the *Railway Age* of October 24, was born on January 17, 1902, at Cleveland, Ohio. Mr. Schier entered railroad service in November, 1919, with the New York Central at Cleveland and in 1920 went with the Chicago & North Western as stenographer. He became a chief clerk for the Chicago,

Elmer A. Schier

Milwaukee, St. Paul & Pacific in 1922. From 1924 to 1931 Mr. Schier served as traveling freight agent for the Western Maryland at Cleveland, and in the latter year became commercial freight agent at Kansas City, Mo. He became general agent for the Western Maryland at San Francisco, Cal., in 1932 and the following year was transferred in the same capacity to Chicago, Ill., which position he held until his recent appointment as general traffic manager for the Pittsburgh & Western Virginia.

OPERATING

C. G. Adams, acting superintendent of the Nebraska-Colorado division of the Chicago, Rock Island & Pacific, with headquarters at Fairbury, Neb., has been appointed superintendent of that division, effective October 22.

F. W. Brown, director of transportation of the Atlantic Coast Line, with headquarters at Wilmington, N. C., has been appointed general manager. **F. L. King** has been appointed superintendent passenger transportation and **H. M. Kendall** has been appointed superintendent freight transportation. **S. D. Hurst, Jr.,** has been appointed assistant to general manager.

A. C. Showalter, general superintendent of the New York, Chicago & St. Louis, with headquarters at Cleveland, Ohio, has been appointed to the newly-created position of assistant general manager, with the same headquarters. **A. D. Peters,** superintendent of the Ft. Wayne and Chicago division, with headquarters at Ft. Wayne, Ind., has been promoted to general superintendent, with headquarters at Cleveland, to succeed Mr. Showalter.

George M. Smith, superintendent of the Baltimore division of the Pennsylvania, with headquarters at Baltimore, Md., has retired, effective October 31, after 55 years of service. Mr. Smith was born on October 9, 1866, in Baltimore county, Md., and entered railroad service in 1881 as brakeman for the Baltimore & Potomac (now the Southern portion of the Baltimore division of the Pennsylvania). He served successively with the P. R. R. as flagman, freight conductor, passenger conductor, assistant trainmaster at Perryville, Md., freight trainmaster at Wilmington, Del., and assistant division superintendent at Shamokin, Pa. In 1918 he became division superintendent and in 1927 was appointed general agent and superintendent at Baltimore. In 1929 Mr. Smith was appointed general agent at Baltimore in charge of general interests of the road and in 1932 he became superintendent of the Baltimore division.

MECHANICAL

Warren Robert Elsey, who has been appointed mechanical engineer of the Pennsylvania, with headquarters at Altoona, Pa., as reported in the *Railway Age* of October 10, was born on April 1, 1892, at Pittsburgh, Pa. He was educated in the public schools of Pittsburgh and Carnegie Institute of Technology. Mr. Elsey entered railroad service on September 26, 1911, with the Pennsylvania and served until 1916 as draftsman at South Pittsburgh, Pa. He then became piece work inspector at Shire Oaks, Pa., and from 1917 to 1920 he served as shop inspector at South Pittsburgh. Mr. Elsey served as assistant master mechanic at Canton, Ohio, from 1920 to 1921 and from the latter year until 1923 he was motive power inspector at Pittsburgh. From 1923 to 1928 he was assistant master mechanic at Johnstown, Pa., and in the latter year became master mechanic at Baltimore, Md. Mr. Elsey was appointed acting superintendent floating equipment at New York in

Bachrach

W. R. Elsey

1929 and became superintendent floating equipment in 1930, which position he held until his appointment as mechanical engineer, effective October 1.

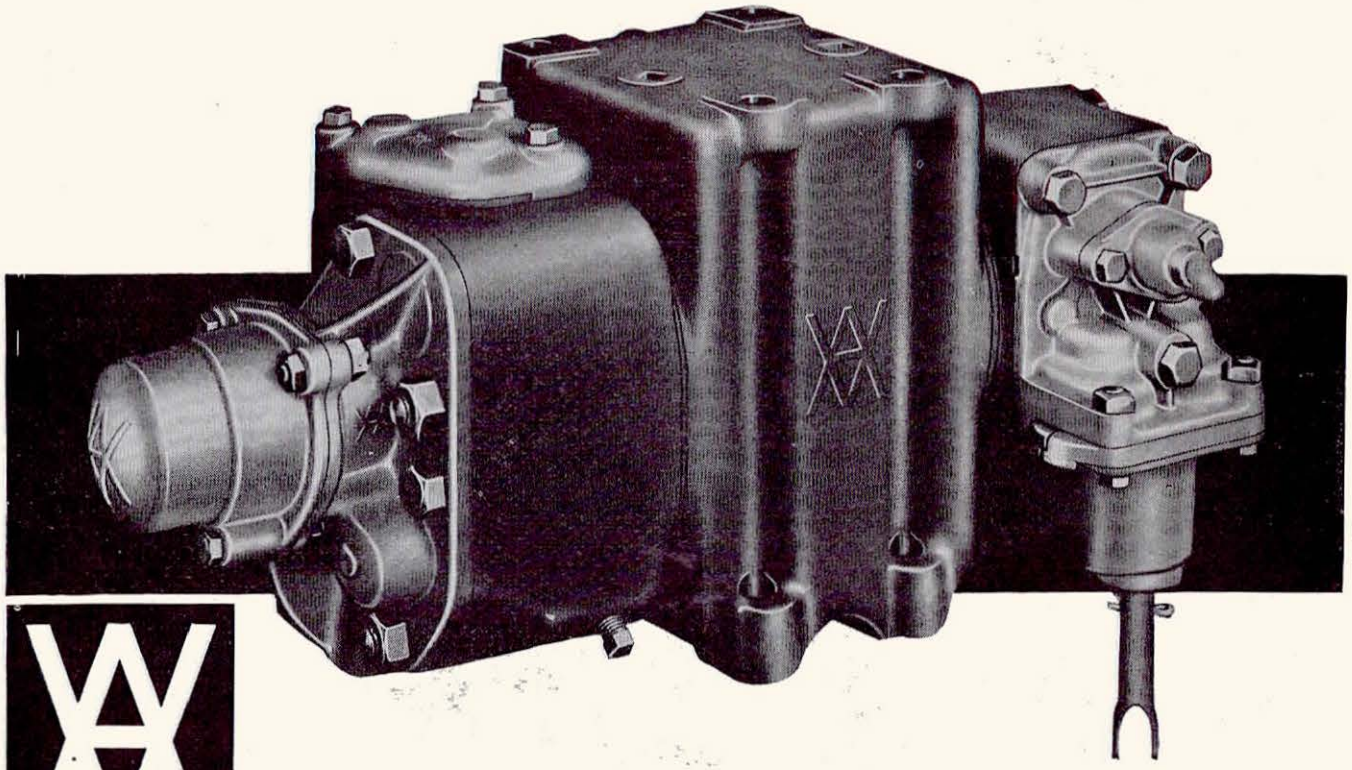
OBITUARY

W. B. Patterson, auditor of revenues of the Chicago, Indianapolis & Louisville, with headquarters at Chicago, died suddenly of heart disease on October 26 at the age of 67 years.

J. M. Cameron, who retired in 1932 as manager of the Esquimalt & Nanaimo, died at Victoria, B. C., on October 9 at the age of 69 years. Prior to becoming manager of the E. & N. in 1928, Mr. Cameron had served for many years with the Canadian Pacific, where he attained the position of general superintendent of the Alberta division.

Eugene C. Morris, comptroller of the Pullman Company, died at his home in Chicago on October 23 of a heart attack. Mr. Morris was born on October 22, 1869, at Middleton, Del., and entered the service of the Pullman Company in the shops at Wilmington in October, 1887. In 1903, he was transferred to the shops at Ludlow, Ky., as an accountant, and subsequently he was sent to Chicago as a clerk in the auditing department. In 1909 he was assigned to the manufacturing department as an auditor and in 1918 he became auditor of the company. Two years later Mr. Morris was advanced to general auditor, holding this position until June, 1929, when he was appointed comptroller.

The Interstate Commerce Commission on October 27 ordered an investigation into the rates, rules, regulations, and practices of carriers by railroad and by motor vehicle affecting and incident to the transportation of naval stores in carloads and in truckloads from Columbia and Hattiesburg, Miss., to Gulfport, Miss., from Laurel, Miss., to Mobile, Ala., and from Columbia, Miss., to New Orleans, La.



The "AB" Brake has Proved its Merits

Recognition of a problematic situation . . . Development of a practical means for solution . . . Realization of the anticipated advantages—this is the sequence through which every worthwhile achievement has progressed.

More stringent and exacting operating conditions demanded a freight brake of greater effectiveness and efficiency . . . The Westinghouse "AB" Equipment was developed to embody the predetermined characteristics . . . Extensive service results have amply demonstrated the merits of this brake in meeting present-day requirements.

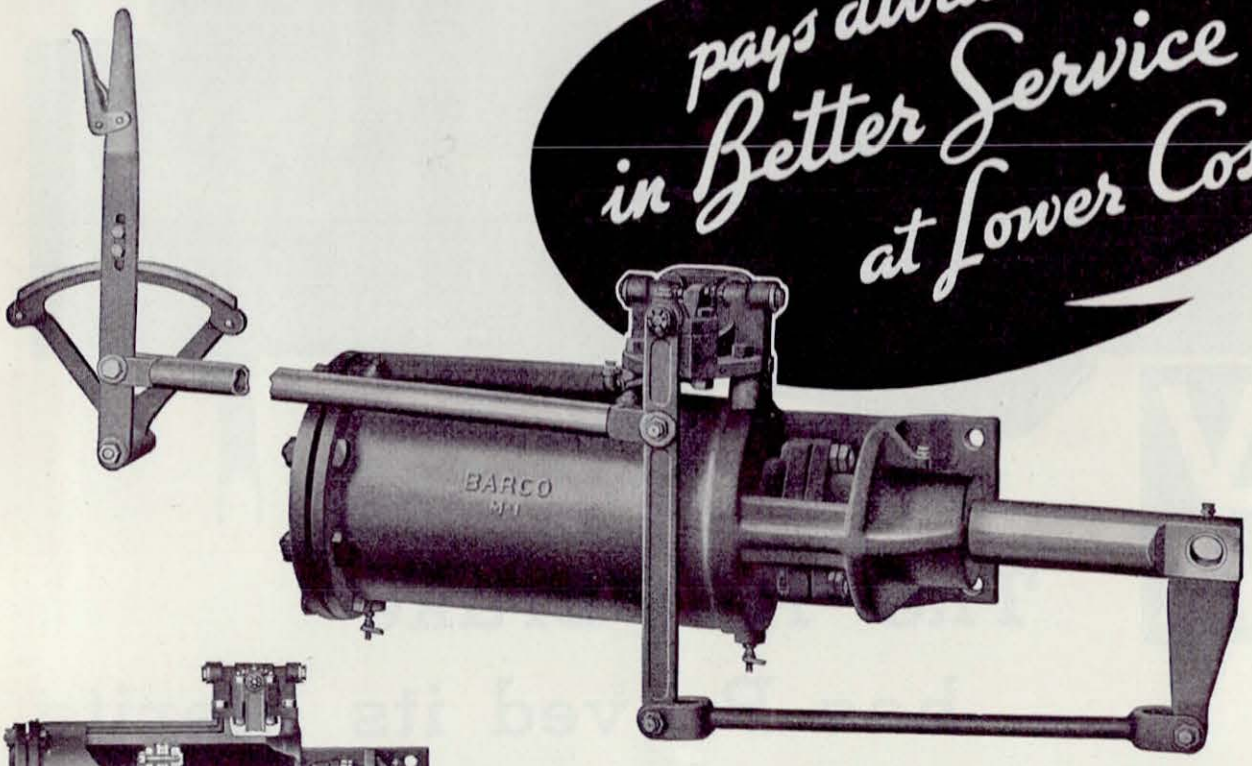
WESTINGHOUSE AIR BRAKE CO.

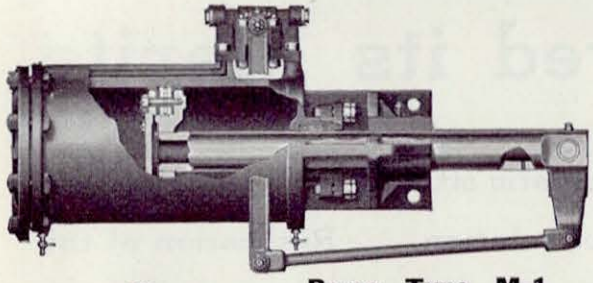
GENERAL OFFICE AND WORKS . . . WILMERDING, PA.

1307

BARCO POWER REVERSE GEAR

pays dividends in Better Service at Lower Cost





Barco Type M-1 Air Cushioned Power Reverse Gear

Interior Barco Dual Control Valve

The Barco Type M Power Reverse Gear has been particularly designed for the present day high speed exacting service.

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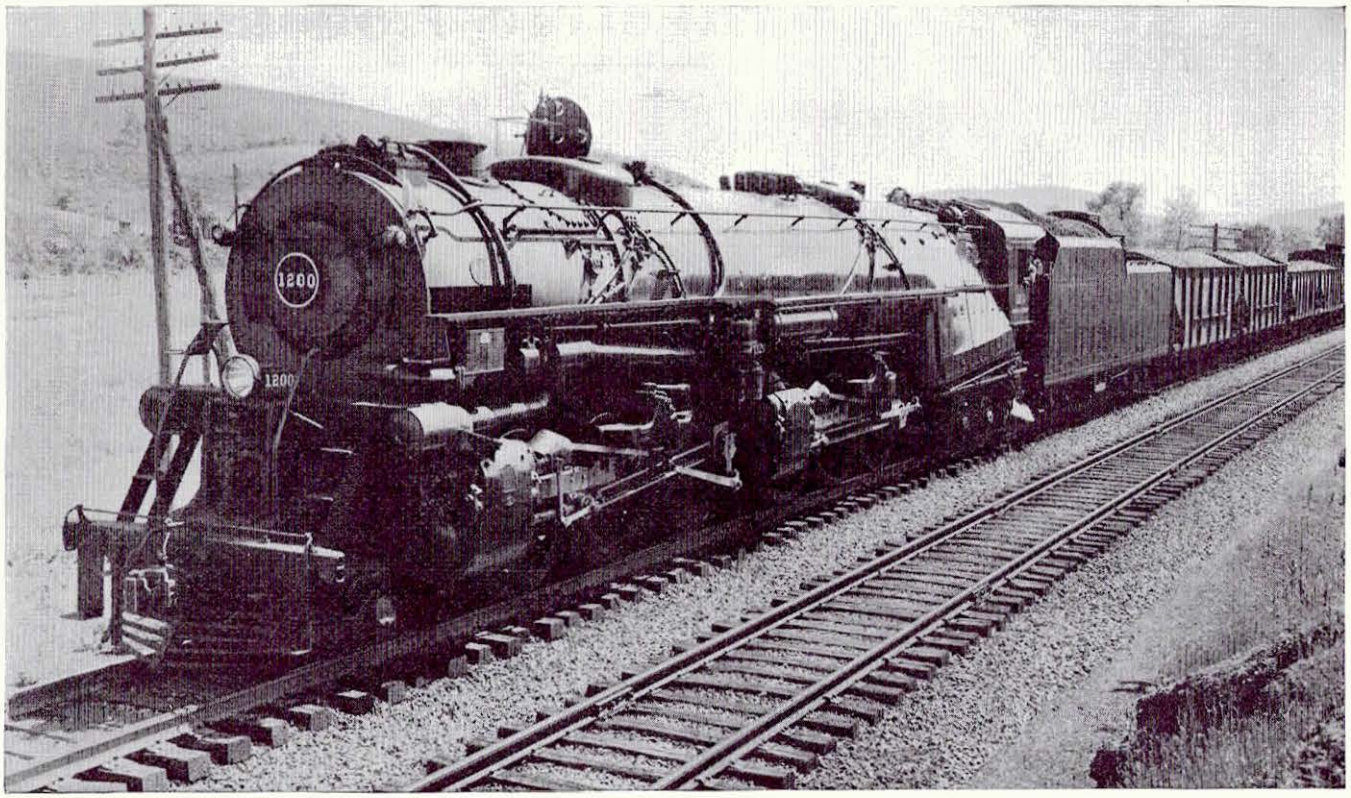

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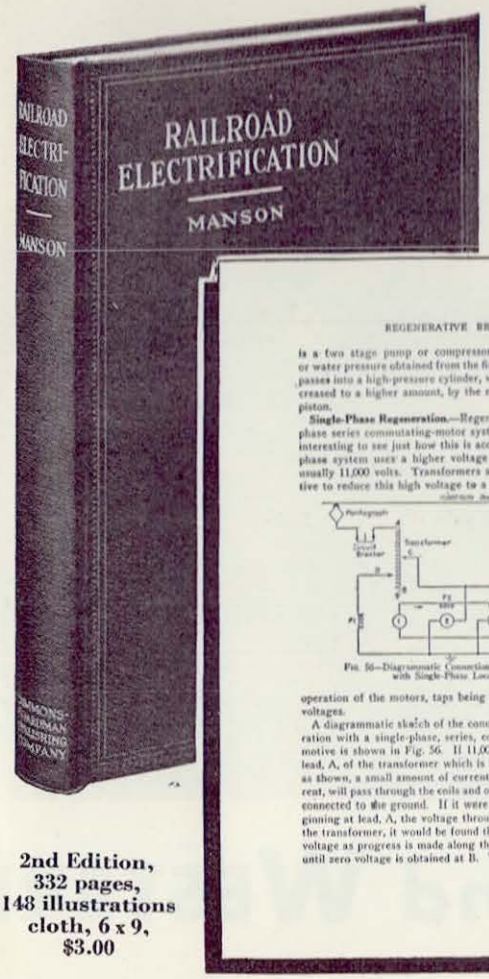
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is a two stage pump or compressor, and the air pressure or water pressure obtained from the first section of the system passes into a high-pressure cylinder, where the pressure is increased to a higher amount, by the movement of the second piston.
Single-Phase Regeneration.—Regeneration with the single-phase series commutating-motor system, is possible and it is interesting to see just how this is accomplished. The single-phase system uses a higher voltage for the overhead wire, usually 11,000 volts. Transformers are used on the locomotive to reduce this high voltage to a voltage suitable for the
Pantograph
Transformer
operation of the motors, taps being taken out at the proper voltages.
A diagrammatic sketch of the connections used for regeneration with a single-phase, series, commutator-type of locomotive is shown in Fig. 56. If 11,000 volts is applied at the lead, A, of the transformer which is represented by the loops as shown, a small amount of current, known as exciting current, will pass through the coils and out at the lead B, which is connected to the ground. If it were possible to measure, beginning at lead, A, the voltage throughout all of the turns of the transformer, it would be found that there is a decrease in voltage as progress is made along the coils from A toward B until zero voltage is obtained at B. Thus it is possible to get
Fig. 56—Diagrammatic Connections for Regeneration with Single-Phase Locomotive

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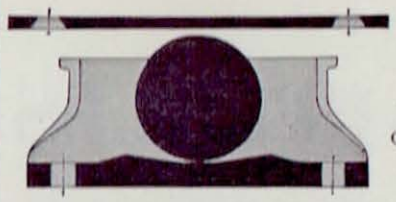

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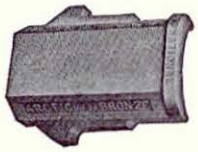

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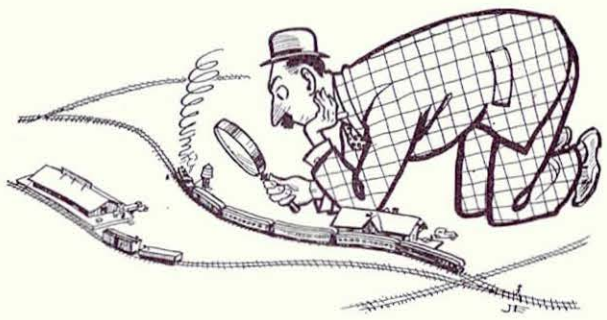

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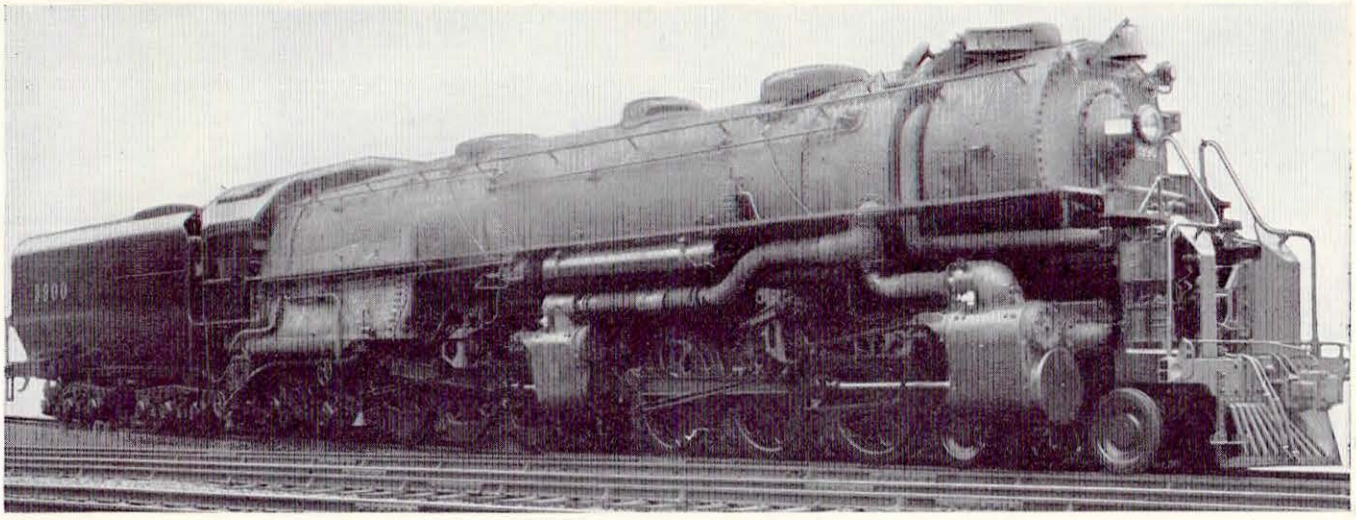

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